

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI
GHANA

**Electronic Procurement Assimilation, Procurement Process and Value for
Money in the Public Sector: Investigating the Role of Influence
Mechanisms and Absorptive Capacity**

By

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A Thesis Submitted to the Department of Supply Chain and Information Systems, School of
Business, College Humanities and Social Sciences in partial fulfilment of the requirements
for the award of the degree of

DOCTOR OF PHILOSOPHY PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

June, 2019

DECLARATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgment is made in the text.

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ABSTRACT

The concept of value for money has become very critical in developing countries where states struggle to raise the needed revenue in-house and must augment with funds from international sources to finance public projects. Given the limited resources available to government, ensuring value for money in procurement is key to attain the optimum utilization of scarce budgetary resources. To realize the objective of value for money in public procurement, several interventions have been employed by developing nations including instilling professionalism in procurement actors, enacting procurement laws and implementing sustainable initiatives. One initiative is the use of electronic procurement systems in the public procurement process. These systems afford public sector organisations to respond rapidly to changes and to pursue technologically innovative strategies. The ability of public institutions to recognize the value of a new information, assimilate and apply it largely depends on the institutions' prior knowledge, institutional pressures emanating from regulations that govern the practice of procurement in the public sector and government policies and initiatives. However, the relationships among institutional pressures, absorptive capacity, e-procurement assimilation and value for money have not been studied. The study first develops a survey instrument to measure value for money and examines how absorptive capacity and institutional pressures influence e-procurement assimilation and the tendering process to achieve value for money in public procurement. A total of 306 public entities were surveyed and partial least squares structural equation modelling was used to analyse the empirical data. Theoretical implications of the study include: 1) institutional pressures and absorptive capacity are key drivers of an efficient and effective tendering process, 2) institutional pressure have direct effect on institutional absorptive capacity, 3) the influence of institutional pressures on e-procurement assimilation is mediated by absorptive capacity, 3) the influence of e-procurement assimilation on value for money is mediated by an efficient tendering process and 4) industry type has marginal statistical significance on the influence of institutional pressures and absorptive capacity on e-procurement assimilation leading to value for money in public procurement. Practical implication of this study include: 1) a legal framework for e-procurement would compel actors to comply and use the application, 2) provision of tools needed to scan, identify and assimilate new information necessary for e-procurement application use would enhance efficient procurement process and 3) the instrument developed could be used to conduct value for money audit prior to the selection of appropriate service providers in public sector tendering.

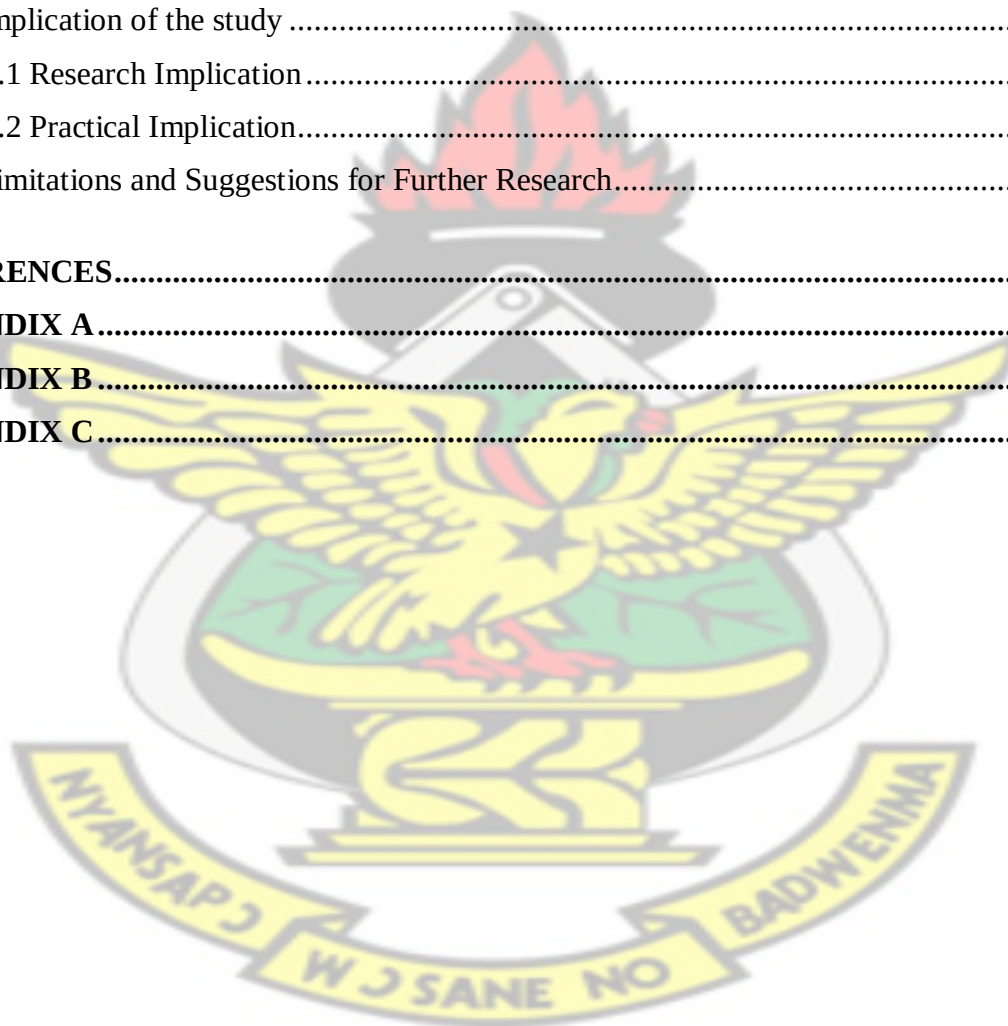
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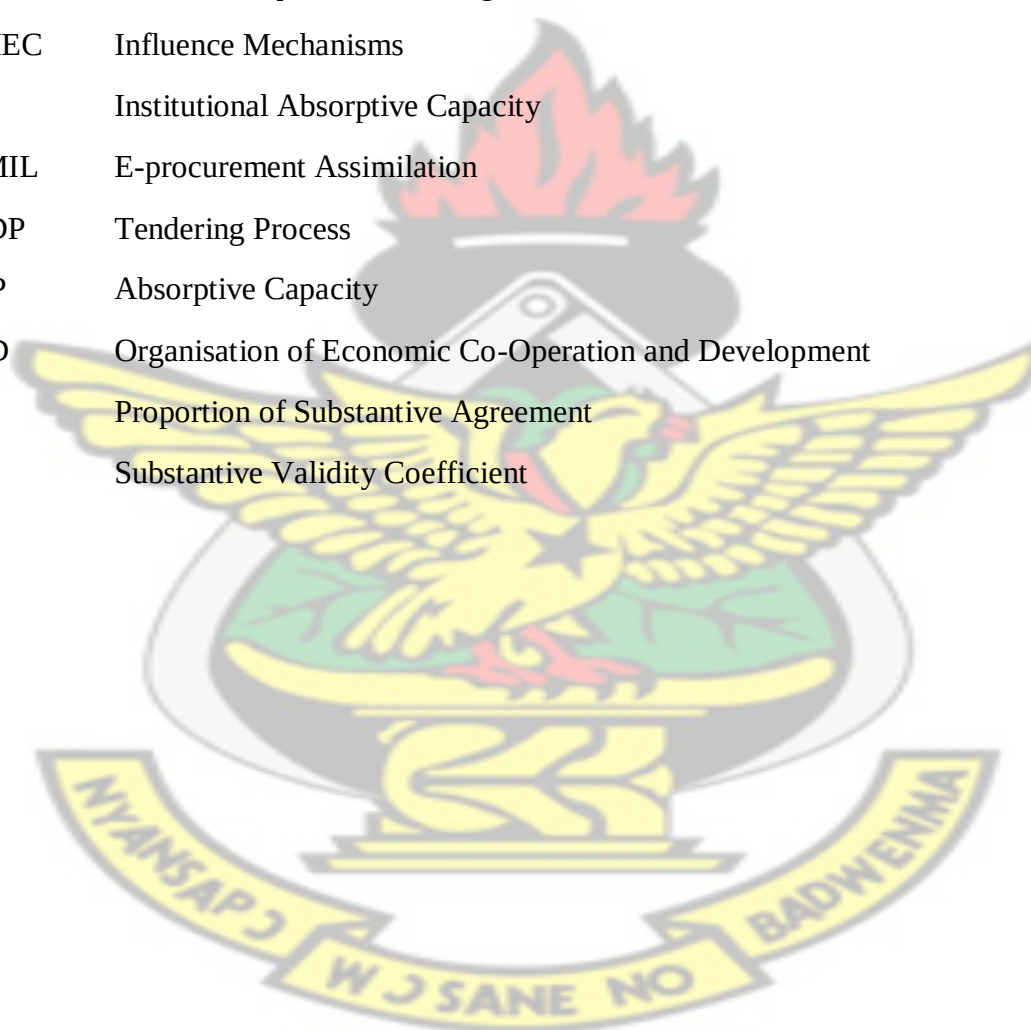
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LIST OF ABBREVIATIONS

PPA	Public Procurement Authority
CIPFA	Chartered Institute of Public Finance and Accountancy
SPFM	Scottish public financial management
GIFMIS	Ghana Integrated Financial Management Information System
MMDAs	Metropolitan, Municipal and District Assemblies
VfM	Value for Money
SEM	Structural Equation Modeling
INFMEC	Influence Mechanisms
IAS	Institutional Absorptive Capacity
ASSMIL	E-procurement Assimilation
TENDP	Tendering Process
ACAP	Absorptive Capacity
OECD	Organisation of Economic Co-Operation and Development
PSA	Proportion of Substantive Agreement
CSV	Substantive Validity Coefficient

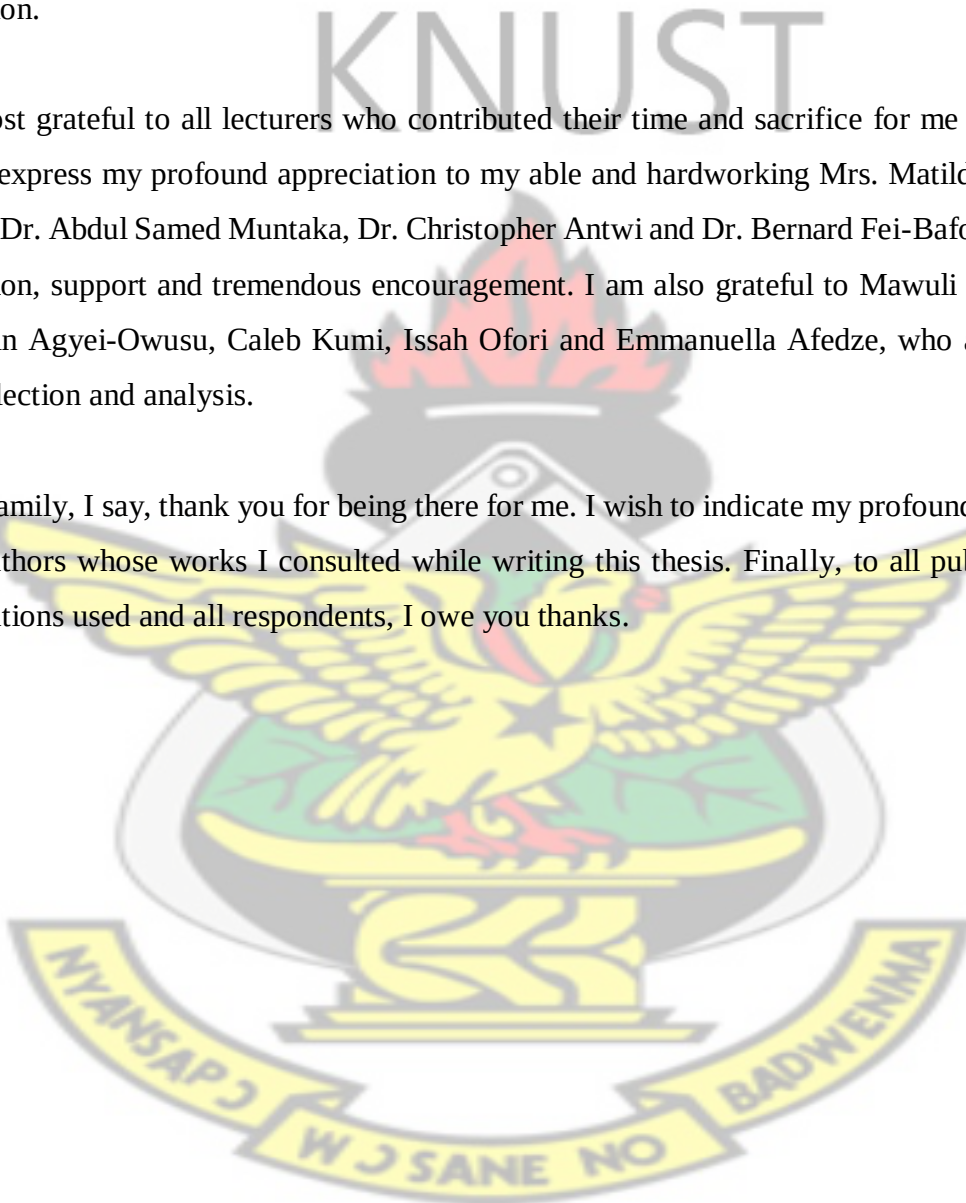


ACKNOWLEDGMENT

I owe the greatest thanks to the Almighty God for showing me his unconditional favour and seeing me through all these years successfully. My sincere gratitude goes to my supervisors, Prof. Francis Kofi Andoh-Baidoo and Dr. David Asamoah, for availing themselves all the time, taking their precious time to supervise this study from the very beginning through to its conclusion.

I am most grateful to all lecturers who contributed their time and sacrifice for me in diverse ways. I express my profound appreciation to my able and hardworking Mrs. Matilda Owusu-Bio and Dr. Abdul Samed Muntaka, Dr. Christopher Antwi and Dr. Bernard Fei-Bafoe for their motivation, support and tremendous encouragement. I am also grateful to Mawuli Amedofu, Benjamin Agyei-Owusu, Caleb Kumi, Issah Ofori and Emmanuella Afedze, who assisted in data collection and analysis.

To my family, I say, thank you for being there for me. I wish to indicate my profound gratitude to all authors whose works I consulted while writing this thesis. Finally, to all public sector organisations used and all respondents, I owe you thanks.



CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Despite the huge financial expenditure that goes into the provision of public goods and services, it is only until a few decades that the area started receiving academic attention. Though policymakers and procurement professionals have paid great attention to procurement improvements and reforms, research has not gained the same momentum until recently (Thai 2001). The effectiveness and efficiency of public procurement systems significantly influence the provision of government services such as roads, hospitals, sanitation, telecommunication, education and other projects and initiatives that promote the wellbeing of the people (ibid). As a result, public procurement has undergone series of reforms to make it more responsive to the needs of the people and to meet the desired goals (Thai 2001). This suggests that public procurement should aim at providing *value* to the beneficiaries. Considering the utmost importance of value creation in public sector procurement, value will have to be managed on a sustainable basis. This is necessary because value management, which is the structural analytic process of achieving value for money by delivering the functions required (quality) at the lowest total cost (Male et al. 2007), enables an entity to maximize the full benefits of procurement (Hanson and Skjutar 2010).

Value for money is the core principle governing public sector procurement (Commonwealth Procurement Guidelines 2005). It entails consideration of the contribution to be made to advancing government's policies and priorities while achieving the best return and performance for the money spent (Bauld and McGuinness 2006). The concept of value for money has become very critical, especially in developing economies where the state struggles to raise the needed revenue in-house and must augment with funds from international sources to finance public projects amidst strict conditions and adherence to international standards. Given the limited resources available to various governments, attaining value for money in procurement is key to ensuring the optimum utilization of scarce budgetary resources where about public procurement market worldwide is estimated at approximately US\$9.5 trillion each year. Of this, developing countries spend an estimated \$820 billion a year worth of citizens funds, about 50 percent or more of their total government expenditure (World Bank, 2016). Value for money is the primary driver for procurement and the common goal for the

procurement process. It therefore, behoves all state governments to manage these expenditures wisely to obtain the required value for money outcome. Achieving value for money, in most jurisdictions, is a statutory requirement, which involves the aggregation of quality, price, technical merit, aesthetics and functional characteristics (Akbiyikli and Eaton 2005).

According to the World Bank (2003), all public procurement of goods, works and services, must be based on value for money assessment and reviews, having due regard to propriety and regularity. Batho Pele Handbook (2007) indicates that value for money is achieved when public procurements are executed economically and efficiently. For this to happen, government departments are required to adopt creative ways to simplify procedures and eliminate wasteful expenditure and inefficiencies to promote productive use of resources in public procurement. Value for money is not about achieving the lowest initial price, but the optimum combination of whole life costs and quality (World Bank 2003). Whole life costing is an investment appraisal and management tool which assesses the total cost of an asset over its whole life. It comprises of the capital cost, cost of operation, maintenance cost, repair cost, upgrade and finally disposal costs (CIPFA 2011) while the quality dimension is the measure of (1) completeness and (2) fitness for purpose (SPFM 2004).

There have been several improvements in the procurement function that provided immense benefits to public sector organizations – the obvious one being cost reduction. Reducing fixed and variable costs through effective procurement strategies can help increase profitability. However, procurement strategies are not merely about reducing cost but also improving the perceived benefit through quality improvement (Barrat and Whitehead 2004). As Atkin and Brooks (2009) put it, the best value is believed to be achieved when accepting the lowest price (cost) in a competitive bidding process where all other criteria (quality, performance and terms and conditions) are held equal. Electronic procurement is one of such innovations introduced in the procurement process is breaking new grounds in the procurement sector in the advanced and emerging economies, as done in the private sector. The electronic application in procurement is not only about replacing the manual transactional activities with the electronic means but re-engineering of the process itself.

1.2 Problem Statement

The current study is motivated by certain deficiencies identified in public procurement and e-procurement literature. These are 1) lack of a comprehensively developed instrument to measure value for money, 2) lack of integrative effect of institutional pressures and absorptive capacity on e-procurement assimilation and 3) lack of literature on e-procurement assimilation's influence on value for money in public procurement. The focus of the literature on value for money has been on conceptualizing the dimensions that constitute value for money from different perspectives: 1) quality-cost (World Bank 2003; CPEM 2004; Rutter and potter 2003; and Dimitri 2013), 2) efficiency and effectiveness (Rutter and potter 2003; CIPSA 2005; Akbiyikli and Eaton 2005 and Barnet et al. 2010) and finally, those who argue that the following principles or factors are attributes of value for money - competitiveness, transparency and fairness, accountability, ethical standards, professionalism and environment compliance (Public Procurement Manual, 2003; Atkinson, 2003; Manu, 2005; Raymond, 2008; Nsiah-Asare and Prempeh 2016 and Raiser 2014). Existing literature on value for money has not conceptualized and developed a comprehensive measure for value for money in procurement, though a few studies have made attempts in public- private partnerships and private financed initiatives (Yuan et al. 2009; Morillos 2008; Akbiyikli and Eaton 2005; Bing et al. 2005 and Burger and Hawkesworth 2011). This study addresses these research gaps from both theoretical and empirical perspectives.

Information Systems (IS) literature offers two distinct influences on assimilation of information technologies(IT)– 1) assimilation driven by internal expertise and learning capability (absorptive capacity) and 2) assimilation driven by external institutional pressures (influence mechanisms) (Saraf et al. 2013). Institutional pressures are found to influence on IS assimilation (Bala and Venkatesh 2007; Liang et al. 2007 and Sherer et al. 2016). Liang et al. (2007) posit that normative pressure has direct influence of ERP usage while mimetic and coercive pressures' influence on ERP. Sherer, Meyerhorfer and Peng (2016), found all the three isomorphism influence IS assimilation in health records management. The influence of Absorptive capacity on IS assimilation is similarly predominant in IS literature (Teo et al. 2003 and Wei et al (2015). Teo et al. (2003) posit that an aggressive technology policy allows organizations to expand and enhance their knowledge base to process a new technology assimilation. Wei et al. (2015) also investigate the antecedents of RFID assimilation and argue that firms with higher absorptive capacity assimilate better than their counterparts. However, firms encounter situations where both institutional pressures and absorptive capacities play a

role in their IS assimilation. With reference to this combined influence of absorptive capacity and institutional pressures on IS assimilation, little is known let alone to mention in public sector procurement. The current study seeks to address this gap in IS and procurement literature.

Furthermore, the influence of the two theories on each other leading to assimilation has not been largely studied with the exception of Bharati and Chaudhury (2011) and Bharati et al. (2013). Bharati and Chaudhury (2011) assert the direct and positive influence of institutional pressure on absorptive capacity in web assimilation while and Bharati et al. (2013) found that the relationship between institutional pressures and assimilation is mediated by absorptive capacity. It is observed from literature that there is no such a study, which focuses on the mediating effect of absorptive capacity in the relationship between institutional pressures and assimilation in e-procurement literature, creating a gap worthy of investigating in the public sector.

Lastly, five outcomes of e-procurement adoption and assimilation have been identified in literature, which are *productivity* (Rai et al. (2006 and Rai, Brown and Tang 2009), 2) *efficiency gains* (Wu et al. 2007), *goals achievement* (Vaidya, Sajeew and Gao 2005), *efficiency and effectiveness* (Rai et al. 2006) and *performance* (Croom and Brandon-Jones 2007 and Kauppi et al. 2013). None of the existing literature has broadly studied value for money as an outcome of e-procurement assimilation in the public sector procurement. This current study fills this gap. This current study is therefore, undertaken to fill these gap identified in e-procurement assimilation and value for money literature in public procurement.

1.3 Objectives of the Study

Considering the gaps in value for money and e-procurement literature, the main purpose of the current study is to first develop a survey instrument to measure value for money and examine the extent to which absorptive capacity and institutional pressures influence e-procurement assimilation and the tendering process to achieve value for money in public procurement

1.3.1 Specific Objectives

1. To develop a comprehensive measure for value for money construct in public procurement.
2. To determine the extent of e-procurement assimilation in the public procurement process.
3. To assess the effects of influence mechanisms on
 - a. absorptive capacity
 - b. e-procurement assimilation
 - c. procurement (Tendering) process.
4. To examine the effects of absorptive capacity on
 - a. e-procurement assimilation
 - b. procurement (Tendering) process
5. To determine the mediating effect of
 - a. absorptive capacity on the relationship between influence mechanisms and e-procurement assimilation.
 - b. the procurement process on the relationship between e-procurement assimilation and value for money
6. To examine the impact of e-procurement assimilation on public procurement process.
7. To ascertain the influence of the procurement process on value for money.
8. To determine the influence of industry effect on the relationship between e-procurement assimilation and value for money.

1.4. Research Questions

This study intends to find answers to the following questions:

1. What is the extent of IT adoption in the public service and to what extent is IT usage assimilated in public procurement process?
2. Do influence mechanisms and absorptive capacity significantly influence e-procurement assimilation in the public sector?
3. What is relationship between influence mechanisms and absorptive capacity in public procurement?
4. Does absorptive capacity mediate the relationship between influence mechanisms and e-procurement assimilation in the public sector?

5. To what extent would e-procurement assimilation really improve the procurement process leading to value for money?
6. Will an effective and efficient procurement process mediate the influence e-procurement assimilation on value for money?
7. Will industry characteristics play any role in the effect of e-procurement assimilation on value for money?

1.5 Justification of the Study

Strong public procurement systems are critical to well-functioning public financial management and good public-sector governance (Raiser 2014). As a result, government takes keen interest in its procurement activities to realize procurement overriding objective – value for money. It is not surprising that government takes centre stage in public procurement because public procurement is an inherently politically sensitive activity as it involves significant amount of public money within the context of national economy (Schapper et al. 2006). The concept of value for money, over the years has become a topical issue by politicians, government officials and social commentators in the media. This study examines how value for money can be achieved in public procurement through the assimilation of e-procurement.

Besides, there are a few literatures on value for money in procurement, and there are similarly few studies examining e-procurement outcomes in the public sector. This study helps fill these research gaps. It is also interesting to note that value for money in public procurement has not attained the needed recognition by way of standard and acceptable way of measuring it. So, any attempt to conceptualize a standard measurement tool ought to be welcomed and that is exactly what this current study sought to contribute – to conceptualize and develop a standard measurement for value for money which could be adopted to spark up fresh discourse on policy framework and procedural standards for public procurement at all levels of decision making.

Several initiatives and developments made in public procurement are aimed at improving the efficiency and value for money but there has not been any significant empirical research to investigate the impact of these interventions on value for money. As Rai et al. (2009) put it, e-procurement assimilation should lead to improvement in procurement productivity. Therefore, the attempt by this study to find out the effect of an assimilated e-procurement system on value

for money in the public sector is a huge contribution to knowledge creation in procurement literature with its underlying practical implications.

Finally, the benefits of the electronic mode of public procurement are immense as they help to facilitate and fast track the tendering information processing, reducing human errors, inculcating transparency and fairness in the bidding process. This will go a long way to forestall the confidence of tenderers in public procurement and also to respond to forces of global sourcing marketplace. This study provides new insights, knowledge and guidelines that would help public sector organizations to fully utilise e-procurement to maximise the associated benefits.

1.6. Summary of Methodology

This study adopts deductive approach because it is theory driven involving the testing of several hypotheses based on the assumptions of the theories being used. Because of the theoretical position of this study, a theoretical framework is constructed which aided data collection and analysis. This study, for its deductive stance, adopts the positivist posture. This is because positivist research is based mainly on deductive style of reasoning (Williamson 2002). The study has defined variables and predicts their relationships through framing of hypotheses. The hypotheses are then tested to either support or corroborate the theories or to disconfirm them (Popper 1959). This study adopts the explanatory research design as it seeks to establish and explain the effect of a procurement process (the explanatory variable) influenced by IT assimilation, influence mechanisms and absorptive capacity on value for money creation (the response variable) in the public sector in the developing economies, controlled by industry effect and the stages in the procurement process.

Because the level of analysis of this study comprises all public sector organizations which are mandated to use Public Procurement Act 2003 (Act 663) and the objective of not limiting the frame to a few organisations, senior managers in the public sector and entity tender committee members form the population of this study. A total of 370 entities were selected comprising of 120 classical, 120 local government (MMDAs), 80 project-based organisations and 50 state-owned enterprises of which about 70% of the population was sampled from Greater Accra region, where the seat of government is located and where all the ministries and the head offices

of most of the state-owned enterprises and other agencies are located. All constructs are measured using a 5- point scale with 1 = strongly disagree and 5 = strongly agree except for normative pressure where 1 = very low and 5 = very high. The study first and foremost develops a survey instrument to measure value for money as suggested by MacKenzie et al. (2011). Structural Equation Modelling (SEM) is used to assess the hypothesized causal paths among the constructs.

1.7 Scope of the Research

This study seeks to investigate how institutional forces and absorptive capacity influence e-procurement assimilation in the public sector and how the latter in turn leads to improving value for money. The study focuses on all public-sector organizations, which use the Public Procurement Act 2003 (Act 663) across Ghana with senior managers as participants. This study conceptualises and categorizes the value for money construct as having 1) economic dimension (Rutter and Potter 2003) and 2) rule-based dimension (Raiser 2014). The economic dimension adapted the quality-cost balance definition (World Bank 2003; CPFM, 2004; CIPS n.d.; Morillos and Amekudzi 2008; UNOPS 2010 and Dimitri 2013; Bergman and Lundberg 2013). The rule-based on the other hand, adapted the constructs of competitiveness, transparency and fairness, accountability, ethical standards and professionalism and later added environmental concerns (Manu 2005; Raymond 2008; Nsiah-Asare and Prempeh 2016; Raiser, 2014). In terms of e-procurement assimilation, this study adapted the Gutman's scale of assimilation as used by Vaidya et al. (2005) and Rai et al. (2009). For the antecedents of e-procurement assimilation, two theories were used – 1) institutional theory (influence mechanisms) by DiMaggio and Powell (1983) as used by Sherer et al. (2016) and 2) absorptive capacity as defined by Kauppi et al. (2013).

1.8 Organization of the Thesis

The thesis is organized and presented in six chapters. Chapter one presents the general overview of the study by letting readers understand the basis of the study. It consists of such areas as the background to the study, problem statement, objectives, justification of the study, scope and organization of the study. The next is chapter two which comprises review of literature relating the core constructs of the study. In this chapter, relevant theoretical and empirical literatures have been reviewed. Chapter three presents conceptualization of the

constructs and identified gaps that the current study seeks to fill as well as the hypotheses. Chapter four describes the methodology applied in the study, explaining the research design, research philosophical underpinnings, population, sample and sampling procedure, the instruments used in data collection and their validity and reliability, and the techniques used in analysing the data. Chapter five presents the results and the discussion of findings of the study, and finally, chapter six covers the summary of the findings, conclusions, implication of findings to research and practice and suggestions for further studies.

1.9 Summary of Chapter

This chapter begins by drawing reader's attention to the developments that have taken place in public procurement in development countries and precisely Ghana, all in the name of realizing value for money. It goes on to make a case for this research stating the gaps and why it is necessary to conduct such a study. In this chapter, objectives are stated, the scope is specified and the organization of the thesis is presented. The proceeding chapter reviews relevant literature relating to public procurement and the key constructs in the research model.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides discussion on the existing literature and theoretical fields that are important to the study when analysing institutional absorptive capacity, e-procurement, value for money and other related topics.

2.1 Institutional Absorptive Capacity

One of the most important concepts emerging in organizational research in recent decades is absorptive capacity. Absorptive capacity is a concept adapted from macroeconomics by Cohen and Levinthal (1990). Absorptive capacity has been defined as the ability of an organization to identify the value of new external knowledge, integrate it, and apply it to commercial ends (Tu et al. 2006). Absorptive capacity has also been referred to as the ability to recognize, integrate, and apply external knowledge for innovation as important factor for organizational improvement (Cohen and Levinthal 1990). Cohen and Levinthal (1989) refer to absorptive capacity as one of an organization's processes as it can identify, assimilate and exploit knowledge from the environment and make it different from other organizations. These dimensions include the ability to duplicate other organization's processes and products and can exploit less commercially focused knowledge such as scientific research. Absorptive capacity can complement, reinforce and refocus an organization's knowledge base and place the organization at a competitive edge over its competitors and grow and increase its market share and profitability. For these reasons, it is essential to develop and maintain absorptive capacity in the organization as it is critical to the success and long term survival of the organization.

Absorptive capacity has been studied at the team, business unit and organisational levels (Jansen et al. 2005; Lane and Lubatkin 1998; Lane et al. 2001 and Tsai 2001). However, recent studies are focused on addressing the nature and sources of absorptive capacity by examining its micro-level fundamentals (Colombo et al. 2013; Lowik et al. 2012; Matusik and Heeley 2005; Ter Wal et al. 2017 and Tortoriello, 2014). Lane et al. (2006) and Volberda et al. (2010) are of the view that more research should be made into absorptive capacity at the individual level as organizational absorptive capacity is engrained in individual absorptive capacity

(Cohen and Levinthal, 1990). In view of this, there is the need to examine how prior need and solution knowledge shape need and solution capacity respectively and how need and absorptive capacity shape employee innovativeness. As absorptive capacity is dependent on domain-specific knowledge according to Dane (2010), it represents the raw building material of individual ingenuity which is structured in domain-specific knowledge structures (Fiske and Taylor 2013). An organisation's ability to absorb information about customers and competitors is identified to be dependent on prior market knowledge (Castillo and Sanchez- Pérez 2013). Targeting information from customers and competitors and targeting information from research institutions and universities which is also known as demand-pull absorptive capacity and science-push absorptive capacity respectively are demonstrated to facilitate innovation in an organization (Murovec and Prodan 2009). Organization innovativeness is influenced by search for new market, technologies and geographical opportunities also known as demand-side search, supply-side search and spatial search respectively (Sidhu et al. 2007). However, while the literature acknowledges need knowledge's importance for innovation, little has been said about need knowledge across organizational boundaries and how it can be exploited internally for innovation and how it can be transferred (Priem et. al. 2012).

Absorptive Capacity in the perspective of supply chain management is referred to as the ability of the enterprises to acquire and integrate information from their partners to attain higher strategic and operational outcomes (Malhotra et al. 2005). In view of this an organization's absorptive capacity will be reliant on potential of its individual members and will develop increasingly to achieve higher outcomes and help the organization grow significantly. Procurement professionals are individuals who act as boundaries between sub-units within the organization or the organization and the external environment upon which absorptive capacity depends. The key in this sense is the idea of buyers acting as boundaries between the e-tools and the whole procurement processes they relate to and how effective and efficient they may be and not just the idea of buyers acting as boundaries between their organizations and supplier's organization. Studies have shown that manufacturing industry is unlikely to be successful when there is software without effective operator and supervisor training and without an effective human/system interface (Guimares et at. 1999). Knowledge gained from prior experience facilitates the identification, selection and implementation of related profitable practices as proposed by theories of absorptive capacity (Lenox et al., 2004). The procurement function may be able to fully utilize the increased information and coordination potential of e-

tool with the presence of absorptive capacity which is a logical and necessary moderating factor. Absorptive capacity suggests theoretical explanations as to why many established procurement organizations gain most from newly introduced knowledge (Schiele 2007). Clemons and Row (1991) opine that sustainable technology advantage does not come from having the same technology, but from its efficient usage when the same technology is made available to all organizations and applications are easily duplicated. With a strong focus on the characteristics of the combination of partners, research on absorptive capacity has evolved (Simonin 2004). Dyer and Singh (1998) referred to the combination of partners as “partner-specific absorptive capacity”. This emphasizes likenesses among partners and the breadth and depth of connection between the partners rather than organization level distinctiveness (Simonin 2004). In this study, absorptive capacity will be studied at the organization-level and further examine the construct at the functional – procurement – level. Prior relevant knowledge, communication network and communication climate are three components contained in an organization’s absorptive capacity (Tu et al. 2006).

However, Cohen and Levinthal (1990) point to a fourth component related to knowledge scanning. Notwithstanding, prior-related knowledge, effective organizational routines and communication processes are major components of absorptive capacity (Zhara and George 2002). Tu et al. (2006) identifies a process view of absorptive capacity and proposes four dimensions of absorptive capacity namely; acquisition, assimilation, transformation and exploitation, whereas Malhotra et al. (2005) mainly adopts a system perspective. This study emphasizes on the approaches of Tu et al. (2006) which focuses on dynamism and organizational mechanisms. Using their work as a basis and building on it, five sub-constructs of absorptive capacity are examined which is transferred specifically into the context of procurement function. The five constructs examined are manager competence and buyer competence which forms the prior relevant knowledge part. The remaining three are communications network, communications climate and knowledge scanning.

Absorptive capacity construct has been used in over 900 peer-reviewed journals and academic papers worldwide since its introduction many years ago. Absorptive capacity has developed rapidly in the literature because of the unique viewpoint it provides. Absorptive capacity also has an overlap with other well-known parts of organizational research and practice which during the same period were also quickly growing. These areas of organizational research are

strategic alliance, organizational learning, resource-based view of the organization and knowledge management. The absorptive capacity literature's growth has significantly benefited from trends in other areas of research. However, it has not reduced the concept's significance.

Cronbach and Meehl (1955) opined that reification threatens the validity of studies that use the concept, which makes it challenging. Many researchers increasingly fail to stipulate the assumption underlying their use of the absorptive capacity construct and most often take the concept for granted. According to Rousseau and House (1994), exploring the various clarification and applications of the concept and examining its assumptions and building blocks is the only way by which the problems created by reification can be addressed. These understandings allow the concept to be reconnected to its network of supporting assumptions and relationships (Cronbach and Meehl 1955). Therefore, to identify the extent of reification and to revive research to begin addressing the problem, a systematic assessment of the literature is required. By considering the propositions and assumptions that define the relationships among the concept, other concepts and measures, the study goes back to the concept of its original context. By examining the absorptive capacity dimensions and how they operate, the study investigates how management research has built on Cohen and Levinthal's ideas. The more peripheral the papers and the less tightly linked the community, the greater the chances are that the community is using the concept in a reified way.

Table 2.1 Absorptive capacity and IS Assimilation

Author(s)	Title	Purpose	Constructs	Research Design	Finding(s)
Cohen and Levinthal (1990)	Absorptive Capacity: A New Perspective on Learning and Innovation	Focuses on the implications of absorptive capacity for the analysis of innovative activities	• Technological opportunity • Appropriability • Absorptive capacity • R and D spending	Cross-sectional survey data on technological opportunity and appropriability conditions	The ease of learning, and thus technology adoption, is affected by the degree to which an innovation is related to the pre-existing knowledge base of prospective users
Lane e t al. (2006)	Relative Absorptive Capacity and Interorganizational Learning	Conducts a detailed analysis of absorptive capacity papers to assess how the construct has been utilized	• Internal drivers • External drivers • exploratory learning • transformative learning and • exploitative learning • Organisation performance	Conceptual model development and literature review	The components of absorptive capacity are redefined as exploratory learning, transformative learning and exploitative learning and sequential which influence an organisation's performance through knowledge and commercial outputs

Zahra and George (2002)	Absorptive Capacity: A Review, Reconceptualization, and Extension	Focuses on identifying key dimensions of absorptive capacity construct	• Knowledge source • Complementarity • Experience • Potential absorptive capacity • Realized absorptive capacity • Competitive advantage	Conceptual model development	Recognises absorptive capacity as a dynamic capability. That the components of absorptive capacity in multidimensional grouped into potential and realised absorptive capacities
Todorova and Durisin (2007)	Absorptive Capacity: Valuing a Reconceptualization	Conceptualises the components of absorptive and reintroduce value recognition	• Knowledge source and prior knowledge as antecedents • Absorptive capacity dimensions • Innovation and innovative performance as outcomes	Conceptual model development	The development of absorptive capacity is a path-dependent process, and the increase of knowledge in an area of expertise at any point in time fosters the future development of capabilities

Vorberda et al. (2010)	Absorbing the Concept of Absorptive Capacity: How to realize its potential in the organization field	Advances understanding of absorptive capacity dimensions and antecedents and its impact on organisation performance	• prior knowledge capacity • Potential absorptive capacity • Realised absorptive capacity • Performance • Competitive advantage • Innovation	Model development through literature review	Potential of the absorptive capacity concept requires more research that shows how "micro-antecedents" and "macro-antecedents" influence future outcomes such as competitive advantage, innovation, and organisation performance
Canison and Fores (2010)	Knowledge absorptive capacity: New insights for its conceptualization and measurement	To contribute to the literature on absorptive capacity through measurement of the key components of the absorptive capacity construct: potential and realized absorptive capacities	• Potential absorptive capacity • Realized absorptive capacity	Instrument and scale development with survey instrument	The results confirm the validity of the proposed scales and support their consolidation as a commonly used instrument with which to measure absorptive capacity.

Ince et al. (2016)	The Effect of Technological Innovation Capabilities and Absorptive Capacity on Organisation Innovativeness	investigate the effects of technological innovation capabilities and absorptive capacity on innovativeness	• Absorptive capacity • Technological innovative capabilities • Innovativeness	Model development through literature review	This study clarifies the relationships among the three constructs
Tu et al. (2006)	Absorptive capacity: Enhancing the assimilation of time-based manufacturing practices	Reviews the construct of absorptive capacity, develops a valid and reliable instrument to measure it	• Prior knowledge • Communications climate • Communications network • Knowledge scanning	Use Q-Sort technique to develop instrument and administered to senior executives	Indicates that absorptive capacity has a positive, direct, and statistically significant effect on time-based manufacturing practice.
Kauppi et al. (2013)	Tools without skills: Exploring the moderating effect of absorptive capacity on the relationship between e-purchasing tools and category performance	examines the moderating role of a purchasing function's absorptive capacity on the relationship between the use of electronic purchasing tools and category level purchasing performance	• E-purchasing tools • purchasing category performance • absorptive capacity	Survey data collected from procurement executives analysed using confirmatory factor analysis and hierarchical moderated regression	Buyer competence, manager competence and communications climate have indirect effect on the relationship between e-purchasing tools and performance.

Fichman and Kemerer (1997)	The Assimilation of Software Process Innovations: An organizational learning perspective	Explains differences in the propensity of organisations to initiate and sustain the assimilation of complex process technologies.	• Awareness • Interest • Evaluation/trial • Commitment • Limited deployment • General deployment	Gutman's scale to assess the level of assimilation	Organizations with higher learning-related scale, greater related knowledge, and greater diversity of knowledge and activities would be more prone to innovate, because such organizations can better amortize learning costs, can more easily acquire the knowledge needed to innovate, and have less they had to learn to begin with
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This reinforces the emerging micro-level literature on absorptive capacity by enlightening absorptive capacity's cognitive foundations at the individual level and shedding more light on how cognitive structures rooted in diverse knowledge areas shape innovation (Colombo et al., 2013; Lowik et al. 2012; Matusik and Heely 2005; Ter Wal et al. 2017; Tortoriello 2014). According to Cohen and Levinthal, (1990) it aids to reconnect absorptive capacity to its different cognitive foundations and counters the concept's reification (Lane et al. 2006). However, to eventually profit from user innovations originating outside the organization, existing research hardly reflects how organizations can absorb these innovations and ideas (Anderson et al. 2014; Priem et al. 2012).

According to Cruz (2011), absorptive capacity has two main concepts being knowledge which is a principal asset for the growth of an organization and considered one of the most significant resources for innovation and the second concept being its subsequent competitive advantage. Cohen and Laveinthal (1990) identified the assumption on which the concept of absorptive capacity is based and stated that organizational absorptive capacity is the organization's capability to assess the significance of new external knowledge, assimilating the knowledge and applying them for commercial purposes. Although the term absorptive capacity has been used by authors such as Kedia and Bhagat (1998) addressing technology transfer between diverse organizational cultures, Cohen and Laveinthal (1990) were the first to approach the concept consistently. Absorptive capacity is the organization's ability to recognize the value of an external knowledge, assimilate that knowledge and apply it strategically for commercial purposes to gain competitive advantage (Cohen and Laveinthal, 1990). They argued that organisations are reactive and proactive and that organizations which have the highest level of absorptive capacity are proactive whereas organizations with little absorptive capacity are reactive. Acknowledgement of the value of information, assimilation of that knowledge by the organization and its application to generate innovation is a three-dimensional model proposed by Cohen and Laveinthal (1990). They state that an organisation's ability to absorb new information is dependent on the acknowledgement of the value of new information and the level of prior knowledge related to basic learning experiences and skills. Organizational background establishing the absorptive capacity is internal research and development and prior knowledge (Cohen and Laveinthal, 1990).

Prior knowledge comprises individual and collective essential capabilities for absorptive capacity (Cruz, 2011), and is defined as the accumulation of diverse knowledge of a company

throughout its existence, such as the characteristics of its workforce and activities related to innovation (Machado and Fracasso 2012). Prior knowledge comprises of innovative practices and workforce characteristics (Cohen and Laveinthal 1990). The individual learning deals with the association between new learning and previous knowledge whereas the workforce characteristics occur with the expertise and qualification of the staff (Cruz 2014). Internal research and development on the other hand adds to the development of technologies that sanction the use of prior knowledge for launching new products and processes (Cruz, 2011). Also, attention was drawn to internal research and development and its contribution to technology development in the organization's field of operation (Cohen and Laveinthal, 1990). Besides Cohen and Laveinthal (1990), several researchers have explored the concept of absorptive capacity (Lane and Lubatkin 1998; Zahra and Gerge 2000; Dyer and Singh 1998; Todorova and Durisin 2007)

2.2 Dimensions of Absorptive Capacity

Absorptive capacity is the ability of an organization to recognize the value of new external knowledge, assimilate that knowledge and apply it to commercial ends (Cohen and Levinthal 1990). Zahra and George (2002) categorized absorptive capacity into two namely **Potential Absorptive capacity** and **Realised Absorptive Capacity**. Potential Absorptive Capacity was conceptualized to include acquisition and assimilation while Realised Absorptive Capacity included transformation and exploitation. This is a modified version of the original measure by Cohen and Levinthal (1990).

2.2.1 Acquisition

In the concept of absorptive capacity, acquisition is defined as an organization's ability and capability to identify skills that are critical to its operations and acquire knowledge which is externally generated. Intensity, speed and directions are the three attributes of absorptive capacity in efforts expanded in the knowledge acquisition process. In determining the quality of an organization's acquisition, it is important to identify the speed and intensity of an organization's effort to identify and gather knowledge. When an organization expends greater efforts, it can build requisite capabilities more quickly (Kim 1997). However, an organisation's ability to recognize speed because of learning stages cannot be reduced easily and some of the resources needed to build absorptive capacity are not swiftly accumulated as this places a limit on the organisation (Clark and Fujimoto 1991). There is the need to have diverse fields of

expertise within an organization to successfully import external technologies since activities of knowledge acquisition and skills differ in their fullness of complexity (Rocha 1997).

2.2.2 Assimilation

Assimilation refers to the organisation's routines and processes that allow it to analyse, process, interpret, and understand the information obtained from external sources (Kim 1997; Szulanski 1996). Leonard-Barton (1995) state that comprehension of knowledge delay because knowledge acquired may represent heuristics that significantly vary from those used by the organization. External knowledge often prevents outsiders from understanding or replicating it because it is context specific (Szulanski 1996). When the acquired knowledge is dependent on the existence of complementary assets that may not be available to the receiving organization receiving, it becomes difficult to comprehend (Teece 1981).

2.2.3 Transformation

An organization's capability and ability to develop and improve practices that facilitate combining newly acquired, existing and assimilated knowledge is known as transformation, which can be achieved by interpreting the same knowledge in a different manner or by deleting or adding knowledge. The character of knowledge through bisociation is changed through transformation and occurs when an idea or a situation is perceived in "two self-consistent but incompatible frames of reference" (Koestler 1966). In shaping the entrepreneurial mind-set, the capability and ability must arise from the bisociation process (McGrath and McMillan 2000) and nurture entrepreneurial mind-set (Smith and DeGregorio 2002). Transformation creates new intuitions, enables the recognition of opportunities and at the same time modifies the way organization sees its competitive environment. It is through these different activities that the formation of new abilities can be originated. To open the black box that has dominated prior research on organizational transformation and strategic change, there is the need to diagnose the transformative elements of absorptive capacity.

2.2.4 Exploitation

Cohen and Levinthal (1990) defined absorptive capacity and placed emphasis on knowledge application. It is based on this definition that exploitation is incorporated as a dimension of absorptive capacity. Exploitation as an organizational capability is established on the practices that allow organizations to acquire skill, cover and influence existing aptitudes or to build new ones by incorporating assimilated and transformed knowledge into its operations. Exploitation

reveals an organization's capacity to produce and integrate knowledge into its operations (Van den Bosch et al. 1999). The processes and practices that allow organizations to attain knowledge is the principal importance of exploitation. Lyles and Schwenk (1992) argue further that exploitation necessitates recovering knowledge that has already been created and adopted for use. Exploitation is evident where knowledge is used to create new capabilities and new projects that capture knowledge from their competitors, market and customers.

2.3 Institutional Theory

Institutional theory describes how individual entities in the context of their environment face pressures to conform to shared behaviour and norms and how these norms and behaviours shape their decisions, over time leading to a certain isomorphism in behaviour and structure (DiMaggio and Powell 1983). Institutional theory describes the effects of external institutional pressures on organizations and defines institutions as regulatory structures, government agencies, laws, courts, and professions, as well as interest groups and public opinion (Lowell 1994). Institutional theory posits that an institution's environment can strongly influence the development of structures in an organization, often more than market pressures. When considering the influence of external social, technical, and political environments on organizational behaviour such as assimilation of innovations, institutional theory is especially inevitable. Institutional effects are dispersed through mimetic, normative, and coercive isomorphism (Scherer et al 2016). These influence mechanisms force organizations to conform to norms, traditions, and social expectations in an institutional environment (Oliver 1997).

Mimetic isomorphism is the copying of another similar organization's behaviour (Scherer 2016) results when organisations mimic other organizations in order to cope with uncertainty and save on search and other learning costs (Bharati and Chaudhury 2011). Mimetic isomorphism results in organizations responding to uncertainty by mimicking actions of other organizations, especially the successful ones (Liang et al. 2007). In the information technology industry, by mimicking others, organizations join an IT innovation assimilation bandwagon generated by prior adopters.

Normative isomorphism is described as the pressure arising through professionalization that leads to members of a certain profession sharing a common set of norms, values, and cognitive models (DiMaggio and Powell 1983). That is learning from others in professional networks.

Organizations learn about innovations from adopters with whom they have direct or indirect ties (Burt 1987). The role of normative pressures in IT assimilation processes is closely related to the key characteristic of ERP systems. Once an ERP package is available for the industry, members of an organizational field such as suppliers, customers, consultants, and even governments collectively evaluate and promote various features of the product, thus shaping institutional norms regarding implementation and consequent assimilation of ERP systems (Swanson and Ramiller 1997).

Coercive isomorphism arises when organisations conform to external pressures exerted upon them by other organizations upon which they are dependent and may arise from government, industry associations, professional networks, and powerful clients and suppliers (Bharati and Chaudhury 2011). Coercive pressures have been shown to be significant in the adoption of innovations (Hu et al. 2006).



Table 2.2 Institutional Pressures and IS Assimilation

Author(s)	Title	Purpose	Constructs	Research Design	Finding(s)
Sherer et al. (2016)	Applying institutional theory to the adoption of electronic health records in the U.S.	This study uses institutional theory to explain adoption of electronic health records	• Coercive • Mimetic • Normative • EHR Adoption	Empirical study with secondary data from electronic health records and health tracking physician survey	It finds that mimetic forces were more critical predictors when there was greater uncertainty, coercive forces were significant predictors after the U.S. government established incentives, and normative forces have continually influenced adoption
Bala and Venkatesh (2007)	Assimilation of Interorganizational Business Process Standards	Uses the relational view of the organisation, institutional theory, and organizational inertia theory to explain the assimilation of IBPS in organizations.	• Relational mechanisms • Influence mechanisms • Inertial mechanisms • Organisation dominance • IBPR assimilation	Cross-case analysis based on data from high-tech industry	Influence mechanisms (coercive, mimetic, and normative pressures) have impact on IBPR for non-dominant organisations.
Bharati et al. (2013)	Social Media Assimilation in Organisations: Investigating the roles of absorptive capacity and institutional pressures	Investigates social media assimilation in organisations by combining organizational innovation and institutional theory	• Institutional pressures • Absorptive capacity • Top management support • Organisational social media assimilation	Survey design	Institutional pressures are found to have no direct effect on social media assimilation but to impact absorptive capacity, which mediates its influence on assimilation.

Liang et al. (2007)	Assimilation of enterprise systems: the effect of institutional theory	Develop and test a theoretical model to investigate assimilation of enterprise systems in the post-implementation stage	• Institutional pressure • Top management support • ERP assimilation	Empirical study with survey design	Normative pressure directly influence ERP usage but coercive and mimetic pressures influence on ERP assimilation is mediated by top management participation
Bharati and Chaudhury (2011)	Impact of Institutional Pressures on Absorptive Capacity of an organisation and Web 2.0 Assimilation	Investigates a theoretical model that combines two streams of research in IT adoption	• Institutional pressures • Absorptive capacity • Top management support • Web assimilation	Empirical study of IT managers and professional with survey design	Finds that institutional factors' influence on web assimilation is mediated by absorptive capacity

2.4 E-Procurement

Public procurement constitutes the largest stake in the government budget and it is therefore important to take proper look at it. Public procurement is a sensitive activity in public or government organizations as huge sums of money or a greater percentage of the budget is allocated to public spend. According to Pegnato (2003), about US\$ 200 billion is allocated to the United States Federal government for purchases per annum. However, US\$ 1 trillion was estimated for local and state government at a combined level (Coggburn 2003).

Public procurement is a set of rules, methods, procedures and processes used by institutions to acquire goods and technical services, works and consulting services using public or private funds. Public procurement also refers to the acquisition of goods, works or other services by a public organization. The Chartered Institute of Procurement and Supply (2013) stated that organizations derive a range of benefits from procurement including; reduction in cost, product innovation and market expansion which are all aimed at supporting organizational strategic goals. Caldwell et al. (2009) stated that the concept of procurement involves advanced planning, scheduling and group buying that helps an organization to increase its profitability through cost savings and more efficient business operations. Bailey et al. (2008) emphasize that procurement is a complete process, starting with the identification of a need until the established need no longer exist or has been filled leading to the closure of the contract that supplied that need to the purchasing organization.

Procurement has evolved into a more strategic role and has contributed significantly to development rather than how it was previously perceived traditional and tactical (Smart, 2010). E-procurement refers to the use of internet and associated technologies to rationalize and perform all operational and strategic procurement activities (Teo et al. 2009). Monczka et al. (2002) quoted the Executive Vice President of AT&T as saying “Purchasing is by far the largest single function at AT&T, nothing we do is more important”. For modern organizations to be more competitive and remain cost effective in an environment characterized by increasing global competition and declining profit margins, the procurement function must be identified as essential and a key focus area (Barratt and Barratt 2011; Hill and Scudder 2002; Frohilich 2002; Monczka et al. 2002; Tazelaar and Snijders 2013). According to Zenz and Thompson (1994), manufacturing organizations spend up to 80% of their revenues on the procurement of

goods and services. These manufacturing organizations have made attempts to rationalize the procurement function and the entire value chain as they have realized the importance of the procurement function and made efforts to respond to cost and revenue pressures and proactively improve operations (Hill et al. 2002). According to Harrison and Hoak (2011), procurement operations ensure the continuous supply of products and services in organizations to allow it to attain its objectives in satisfying the end customer or consumer needs and boost customer confidence. In recent times, e-commerce is playing major roles in the global market (Gunasekaran et al. 2009). Business – to – Business e-commerce models and practices have been most significant due to e-procurement element.

Defining e-procurement is a bit difficult as there is no single definition for the process. According to Viadya et al. (2003), there is confusion in the definition of e-procurement. To prove their participation in the e-commerce revolution, many authorities have synonymously used the term e-procurement and e-purchasing (MacManus, 2002). Electronic procurement is the efficient means to acquire goods, services and works at a reduced cost and increase profitability due to the increasing number of competing organizations. Croom and Brandon-Jones (2004) defined e-procurement as the use of internet-based information and communication technologies (ICT) to perform individual or all stages of the procurement process including search, sourcing, negotiation, ordering, receipt and post purchase review. According to Dawn et al. (2010), academicians and practitioners alike agree that e-procurement can facilitate assimilation within an organization as well as across the supply chain. E-procurement comes in various forms taking into consideration the various stages of the procurement process which are e-Tendering, e-Auction/Reverse Auction, e-Marketplace, e-Catalogue/Purchasing, among others. E-procurement is an end-to-end solution that streamlines, coordinates and integrates several procurement processes throughout the organization. According to DOIR (2001), end-to-end e-procurement academic and industry analysis show that the model is rarely achieved although it is popular, and its implementation includes diverse models (Stenning and Associates 2003). Cuthbert et al. (2003) stated that end-to-end e-procurement solutions offer vibrant and strong functionality that are intended precisely to excel in just one or few applications. Electronic fax, general email, non-internet or web-based approaches and voice communications are not considered as an end-to-end procurement system. They are considered as partial traditional e-procurement solutions. E-procurement is seen as a subsection of e-commerce as it is the essential enabler of e-Business supply chain.

Table 2.3 Electronic Procurement and procurement outcome

Author(s)	Title	Purpose	Constructs	Research Design	Finding(s)
Rai et al. (2009)	Organizational Assimilation of Electronic Procurement Innovations	Investigates the assimilation of electronic procurement innovations (EPIs) and its impact on procurement productivity in buyer organization	• Top management support • Trusting and beliefs of suppliers • Security safeguard • Organisational readiness • EPI standard efficacy • Aggregated	Survey design	The results provide evidence of a substantial impact of the assimilation of these innovations on procurement productivity
Vaidya et al. (2005)	E- Procurement Assimilation: and assessment of E-business capabilities and supplier readiness	Assesses organisational e-business capabilities and supplier readiness in the public sector	• Organisational E-procurement capabilities • Supplier readiness • Intensity of E-procurement assimilation	Extensive literature review and pilot study	E-Business capabilities and supplier e-Business readiness can impact the transactional and strategic assimilation of e-Procurement
Vaidya et al. (2007)	Critical Factors That Influence E-Procurement Implementation Success In The Public Sector	finds the critical success factors underlying the implementation of e-procurement	• Critical success factors • Organisational perspectives (practices, processes, technology and systems) • Impact (e-procurement success)	An extensive survey of the available e-Procurement literature uncovered assessment and	It finds top management support and performance measurement as critical factors of e-procurement leading

				evaluation reports of eight e-Procurement initiatives and five specialized research studies on e-Procurement	to user and supplier satisfaction
Armstrong and Sambamurthy (1999)	Information Technology Assimilation in Organisations: The Influence of Senior Leadership and IT Infrastructures	Examines the influence of senior leadership, sophistication of IT infrastructures, and organizational size on IT assimilation	• Senior leadership knowledge • Systems of knowing • IT Assimilation	Survey	Senior managers' business and IT knowledge significantly influenced IT assimilation
Wu et al. (2007)	Antecedents and Outcome of E-Procurement Adoption: An Integrative Model	Focuses on the influence of the antecedents of the two types e-procurement and how they in turn impact relationship development and efficiency gains	• Top management emphasis • Organizational learning ability • Normative pressure • Intensity of e-procurement adoption • Relationship development • Efficiency gains	Empirical study of data collected from senior managers in technology-intensive industries	Finds that transactional application of e-procurement directly leads to <i>efficiency gains</i>

Croom and Brandon-Jones (2007)	Impact of E-Procurement: Experiences from Implementation in the UK Public Sector	Examines the impact of e-procurement implementation and operation on organizational processes and performance	• System Specification • Implementation management • E-procurement impact (performance)	A survey of organizations involved had experience of e-procurement systems implementation	The study finds the impact of e-procurement implementation on performance as positive
Kauppi et al. (2013)	Tools without skills: Exploring the moderating effect of absorptive capacity on the relationship between e-purchasing tools and category performance	Examines the moderating role of a purchasing function's absorptive capacity on the relationship between the use of electronic purchasing tools and category level purchasing performance	• E-purchasing tools • purchasing category performance • absorptive capacity	Survey data collected from procurement executives in ten countries analysed using confirmatory factor analysis and hierarchical moderated regression	The results demonstrate few significant direct effects of e-purchasing tools on category performance

Additionally, e-procurement is viewed by supply chain managers as an understanding of the effect of information technology on the acquisition of capability and ability on a practical level (Dong et al. 2009; Jonsson and Gunnarson 2005; Presutti, 2003). According to Neef (2001), the supply chain becomes an ongoing process and a continuous process which extends from the organization through to its partners and suppliers as e-procurement makes way for development of the extended enterprise. In this instance, one of the major drivers for supply chain management is e-procurement. As technology has significantly transformed supply chain management in many organizations, Breite and Vanharanta (2001) state that compared to other technologies being used by organizations, information technology has expansively changed the idea of the supply chain management.

When manual transactions are replaced with automation, an organization can save time and has more flexibility and control over its operations and processes. Kalakota and Whinston (1997) defined e-procurement from communication, collaboration, business, service and online perspectives. From the communication perspective, they defined e-procurement as the procurement and supply of goods and services, payment or information over a computer network or through electronic means. E-procurement from the perspective of collaboration is defined as the continuous use of information and communication technology from the point of beginning to the point it ends along the entire value chain of the organization processes and procedures done electronically and designed to allow the achievement of the organization's goal. It is a basis for inter-organizational alliance. E-procurement is defined from the business perspective as the automation of business transactions and workflow through the application of technology. E-procurement is defined from the service perspective as a tool that addresses the needs of an organization, management and customers to reduce service costs and at the same time increasing service delivery speed. The definition of e-procurement from the online perspective is the ability to buy and sell goods and services as well as information on online services and on the internet. According to Wigand (1997) the processes may be complete or partial and may include business to business, business to customer and customer to business transactions. Implementation of innovations in technology such as electronic procurement helps organizations to obtain boosts in their operations since it affords the organization to acquire materials needed in a fastest manner. The implementation and use of e-procurement helps an organization to attain a variety of benefits which includes enhanced accuracy, reduced cycle lead times, proper coordination with organization's partners and improved financial

performance (Mishra et al. 2007; Rai and Tang 2010). According to Thai (2001), public procurement is an essential function of government which takes major share of the budgetary allocations. The public procurement satisfies the necessities for goods, works and services in a timely manner to avoid delays in acquisitions of items. Wittig (2003) is of the view that public procurement must satisfy the basic principles of accountability, transparency, integrity and fairness. However, Thai (2001) asserts that research into public procurement has been relegated to the background by the academia, although government organization's policies and procurement professionals have accepted and given much attention to procurement improvement and reforms in their respective organizations.

The current trends in e-procurement initiatives implementation in the various organizations must also be assessed as an effort to develop public procurement to ensure effective and efficient public procurement goals which includes minimizing business, quality, timeous efforts, cost, technical and financial risks, maintaining integrity, fairness and minimizing competition (Thai 2001). According to Miami-Dade County (2000) report, e-procurement in the public sector can promote efficiency and provide significant cost savings. Many governments have used "e-procurement" and "e-purchasing" synonymously to demonstrate their contribution in e-commerce revolution (MacManus 2002) and that "purchasing" has a narrower scope. E-procurement is referred to as the use of internet-based information and communication technologies to perform one or more transactional or strategic procurement activities. While there is no uniformity in defining procurement processes in existing literature, Vaidal et al. (2007) consider various transactional and strategic procurement activities as the standard procurement processes which can be adapted by using the e-procurement technologies such as e-tendering, e-auction, e-catalogues, e-market place and integrated third party or in-house software (Gebauer and Segev 2001). Henriksen et al. (2004) opined that due to the nature of materials or items being procured by public sector institutions, it is the best place to start using e-procurement for goods and services.

Croom and Brandon-Jones (2007) described e-purchasing as employing across part or entire organization's procurement processes numerous combined database system and a wide area network communication technology. The procurement process includes initial identification of need, user specification, searching for supplier, sourcing, tendering, negotiation, order placement, authorization, receipt of goods, payment and post supply evaluation (Caniato et. al.

2010; Slack et al. 2011). E-sourcing, e-process tools and e-transaction tools are the three main categories of e-procurement.

The sourcing process, beginning with product or service specification to the final negotiation and supplier selection are supported by e-sourcing tools. The uses of electronic supplier database, e-tendering and reverse e-auction are the most common e-sourcing tools (Hartley et al. 2004; Bartezzaghi and Ronchi 2005). E-process tools support an organization's order cycle by leveraging an automatic authorization workflow, digitally placing orders and tracking the status of order placed (Croom, 2000; Yen and Ng 2003). External communication between an organization and its suppliers is supported by e-transaction tools. The most common among these e-transaction tools are electronic invoicing, electronic data interchange and automated or electronic payments (Sriram and Stump 2007; Sanders 2007). Integrating systems between and within organizations is a potentially powerful source of supply chain improvement and this is because of the use of e-purchasing tools (Power and Singh 2007; Sanders 2007). According to Brandon-Jones and Carey (2011), reduction in purchased prices, increased contract compliance, lower costs of managing the procurement process and improvement in user and customer satisfaction result from the use of e-purchasing tools. An increased understanding of how to maximize potential significance is needed as organizations consider opportunities to invest in these different technologies and make ensuing changes to their organization, supply base and organization processes (Johnson et al., 2007). Sanders (2007) states that it is important for organizations to consider the impact of different types of information technologies on the performance of the organization as investing in e-purchasing tools require large expenditure. Several researchers have examined the relationship that exists e-procurement and performance (De Boer et al. 2002); Bartezzaghi and Ronchi 2004; Croom and Brandon-Jones 2007). However, other researchers have taken the stance that information technology cannot bring competitive advantage without being combined with other organisation capabilities (Jeffers, 2010). Researchers have also argued that competitors often look to duplicate investments in information technology by organizations because of industry sector isomorphism (Bharawaj 2000). The resource-based view proposes that the search for IT-based competitive advantage must focus more on the process of managing and organizing IT within the organization and less on IT alone (Mata al. 1995). Caniato et al. (2005) contend that human interface is needed to maximize the transactional and information improvement potential of e-tools as IT creates advantage by leveraging and exploiting pre-existing complementary human factors.

Competitive advantage is attained and sustained from competences based on socially complex organizational procedures and processes that are established over a long period of time and are not easily observed (Lewis et al. 2010). Rosenzweig and Roth (2007) call for the incorporation of a more socio-technical system method in future supply chain research where success hinges on the position of people using the suitable and right techniques and tools. According to van Weele (2010), e-procurement has fashioned a new way of procuring products and improved the scope for innovation and flexibility in procurement functions. The study will evaluate the possible direct and indirect effect of e-procurement instrument on value for money performance as well as its impact on the organization.

Electronic market places are official sites used by organizations to acquire goods and services in the e-procurement processes. E-marketplace provides the service previously provided by a supplier's catalogue to the buyer in a setup which is in line with e-procurement system. Marketplaces customize the products in the form of data that the supplier can provide for the buyer. Porter (2000) states that suppliers tailor and format the catalogue such that comparison of specification and prices adapt to the procurement system of the buyer. E- Marketplace platform requirements are met and hence, both the buyer and the supplier could avoid misrepresentation and misinterpretation of data. According to Feldman (2000), the anonymity of some suppliers may contradict with reliability that partners in any transaction required.

E-Auctions are sites on the internet which perform auction sales online for the purchasers and suppliers to bid for the goods and services at their convenience and in a faster manner. The procurement department sends request for the quotation to different suppliers to choose from that product or service. According to Rajkumar (2001), marketplaces are where auction sales take place at an effective and efficient way.

E-sourcing is the process that identifies and selects new suppliers using appropriate methods of procurement for a specific category of purchasing that can be attained by employing the internet technology. Selection of the most appropriate and qualified supplier and its related assessment procedures are of utmost importance to the management of every organization. The identification of qualified suppliers, mostly those individuals and organizations that have the capacity and ability to meet customer's expectations and their performance expectancy level as well as periodic supervision and control pose a complex challenge (Baily et al. 2005). According to Bruno et al. (2009), the supplier selection process has received substantial

consideration in the business management literature with an emphasis on the quality of supply (Chen et al. 2004). Piramuthu (2005) emphasized that incorrect decision on sourcing may lead to interruptions in the supply of goods and services and subsequently pose serious challenges in both public and private organization's operations. To ensure competition and fairness in public procurement, policies are established by government which aims at encouraging all suppliers to be transparent in their dealings with respect to price, quality and environmental concerns (Malmberg 2003). In the same vein, e-sourcing also forbids award of contracts based on discretionary standards. Similarly, Panayiotou et al. (2004) state that in the public sector, prescribed procedures must be followed, and transparency and accountability maintained in public procurement by awarding committee who are usually a commission of experts selected by the public authority. To achieve this, the committee must embrace stringent and clear processes for decision making that enhance the specific service objectives and at the same time consider the effect on the procurement procedures of the government organization considered and avoid any subjective evaluation of suppliers to ensure value for money.

The activities to be undertaken at the sourcing stage include prequalification of prospective suppliers, preparation of tender document, issuing and sale of tender document, request for quotation and proposals, tender evaluation and selection of responsive tenderer or supplier. A procurement professional or entity may increase or maximize competition by identifying new suppliers during the tendering process for a procurement category which aids the process. However, according to Kraljic (1983), e-sourcing can help decrease supply risk associated with this category. According to Presutti (2003), e-sourcing helps the procuring organization taking into consideration all the stages of the supplier selection process beginning with supplier prequalification, preparation of complete request for proposal document, selection of the best responsive supplier and the award of contract. In recent years, the governments of several countries have begun the use of innovative methodologies for the selection of suppliers drawn from recognized practices of the private sector (de Boer et al. 2001; Panayiotou et al. 2004; Erridge and Callender 2005; Love et al. 2011). This indicates that both the private and public sectors share common features with respect to their methods of procurement. Weber et al. (1991) reviewed 74 articles and concluded that selection of suppliers is a multi-objective problem as the supplier selection process contains contradictory objectives such as quantity, delivery, quality, capacity, performance, communication, geographical location, service and lowest price (Degraeve et al. 2000; Morlacchi 1999). The cross-efficiency evaluation based

on the Data Envelopment Analysis (DEA) for the evaluation of different offers in public tender awarded through the Most Economically Advantageous Tender (MEAT) criteria is the proposed approach. Furthermore, it is important to rate potential suppliers based on their capacity and capability to meet technical requirements. A corrupt procurement officer could connive and favour a supplier unfairly to the disadvantage of other competitors because of the inducement they would gain from the supplier while impartial assessment makes such event more challenging to happen. To enhance fairness, it is important to ensure that the method for the award must have high degree of objectivity. Effective sourcing decision is made when all pertinent factors have been considered and evaluated against the risks and opportunities which apply. Sourcing involves much more than just picking suppliers; it involves a continuing relationship with preferred and potential suppliers.

The process of making an offer or proposal and expressing interest in response to an invitation to tender is tendering. Based on the procurement type, requirements or category, a tender can be classified. Tenders are classified under various types and the main ones often used by organizations are National Competitive Tender (NCT), International Competitive Tender (ICT), Restricted Tender (RT), Two-Stage Tender, Single Source and Request for quotation. In the public sector, the threshold determines the method of procurement. The Public Procurement Act 2003 (Act 663) has prescribed the method of procurement or the type of tender to use depending of the threshold. However, e-tendering is the process of sending Request for Information (RFIs) and Request for Proposals (RFPs) to competent suppliers who are interested and obtaining the suppliers' responses via internet technology. E-tendering is sometimes used to support the analysis and comparison of tenders received from various suppliers. E-tendering is used for the preliminary process that leads to contract and not used to close a deal with suppliers. According to Weele (1988), e-tendering is to streamline most of the tactical procurement processes without concentrating on the content of the process. Electronic payment system is a sure and faster way of controlling the cash flow of the business organization and a way of managing the efficient and effective payment of the procurement processes. It ensures accurate and timeous information on the management and payment of the procurement contract. Using electronic payment comes with many benefits with respect to electronic invoicing that is often not ignored when electronic payments are made and suppliers are given rapid payment assurance during negotiations. In her article from Bill Michel, the president of ADR North America and Senior Vice President of the Institute of Supply

Management, McCrea (2013) opines that there are various methods for purchasers to better influence web to reduce costs related to procurement processes and gave examples of five beneficial ways.

1. To help organizations save time and resources by letting them to make speedy and precise tender analysis, it is essential for organizations to hold suppliers liable by allowing them use structured e-procurement templates. The organization's suppliers should respond to specific queries and write them in a format preferred by the organization.
2. Request for proposals (RFPs) are structured in a way that clears all doubts on the suppliers' end. All doubts with respect to traditional tendering are removed by e-procurement.
3. Supply base of an organization is easily and simply consolidated when e-procurement is used and helps greatly in cutting down costs.
4. E-auction helps organizations to save more money when they are used for commodity products. E-auction is an online bidding where suppliers bid against each other in real time when they log in.
5. Purchasers make purchasing decisions effectively and efficiently as electronic purchasers can develop competent and actual scenarios by using information produced by their e-procurement system when exploiting global scenario planning.

According to McCrea (2013), an organization can save time and energy and focus on other core tasks and improvements. This is because of the multilingual currency capabilities that the e-procurement programme encompasses which are often used for international procurement.

2.5 Application of E-Procurement

Electronic data interchange (EDI), enterprise resource planning, electronic mail (e-mail), e-market place, e-catalogues and electronic contract management system are computer-based e-procurement application that has emerged because of the increase use of the internet. Neef (2001) argued that e-procurement is a valuable and viable means of doing business and has the potential of being adopted by both small and large organizations notwithstanding the type of application being used. E-procurement application system was developed from Electronic data interchange in the 1970s to aid organizations to improve their procurement processes to achieve value for money (Wisner et al. 2012). Electronic data interchange is the process and means of

transmitting standard business documents or information through electronic means by the use of a computer within and between organizations without human interventions. Electronic data interchange is an intra and/or inter organizational exchange of document or information and business data in a standard format from one computer to another. Improving accuracy and speed in the flow of information by connecting computer applications between organizations and the removal of duplicate data record are the drivers of electronic data interchange. The electronic data interchange system application enables the exchange of data between a procurement organization and the supplier in a computer-based manner and has been adopted by many organizations since its inception. Despite how the electronic data interchange software works, it is highly expensive, and its implementation is difficult hindering the widespread usage to aid e-procurement (Presutti 2003). Since 1990s the use of internet applications became rampant affording significant opportunities to the companies to purchase items online in a more efficient and effective manner hence increase productivity and profitability. The adoption and development of information systems are essential to e-procurement application and implementation. According to Rajkumar (2001), system integration is a critical success factor for the implementation of e-procurement taking into consideration the information infrastructure of the customer and linking it to the suppliers. Croom (2001) surveyed IOS adoption pattern and stated that the list was dominated by email, websites, EDI and fund transfer. Electronic data interchange has been classified as an application which is cost effective for transactions of high volume and communication between and within shared trading hierarchies in an organization. Nonetheless, EDI is essential and installed for managing direct supply chain. Examples are products sealed in retailing and materials and components in manufacturing.

E-catalogue is another e-procurement application which is widely used to purchase products and services electronically from online for organizations usage (Baron and Shaw 2000). E-catalogue therefore, provides some linkage to where products can be found, suppliers of the products and how ordering can be done that will lead to the significant increase of system operationalization of the organisations.

2.5.1 E-Procurement Implementation Strategy

The production of documents and executable techniques before the arrangement of the e-Procurement solutions is an imperative critical success factor (Neef 2001). This thought is additionally bolstered by the OSD Report (2001) discoveries that as the procurement technique

is planned to give reserve funds enabled by the technology. E-Procurement ought to be procurement-driven as well as technology-driven. In this way, an obviously characterized e-Procurement technique not just accentuates the significance of e-Procurement in the public sector, but additionally contemplates major institutional changes from the procurement procedure viewpoint just as from the organizational point of view (World Bank 2003). Another report noticed that the e-Procurement system ought to be founded on the introduction of sound procurement practices while considering the distinctions in requirements of public and private sectors (DOF 2001). E-procurement requires different purchaser-supplier systems to exchange information and electronic documents to function effectively and efficiently. The XML standard characterizes the content in communication and in the selection of general data formats and operability (KPMG, 2001). In characterizing e-procurement prerequisites, Birks et al. (2001) guarantee a key concern is the standard for arranging electronic catalogues. The World Bank (2003) recommends that building up an e-procurement system in an open environment enables connection to different systems for interoperability and improves updating the systems. As per the DOF (2001), fruitful introduction and adoption of e-procurement in public sector additionally rely upon the ease with which procurement related information can be traded both inside the organizations and between their supply bases to aid acquisition of products, works and services.

2.5.2 Benefits of Implementing E-Procurement

The evolution of procurement is required to improve the position and impact of the procurement function within organizations (Croom 2000; Osmonbekov et al. 2000). E-procurement helps improve the efficiency of the procurement organization to easily get items on a timely and cost-effective manner. Procurement of items differ from one organization to another organization depending on the requirements of the specific entity and at a specific time. In purchasing items, there are essential tenets and exercises that should have been performed. The purchasing entity had to pursue some fundamental steps. E-Procurement has given a better option in contrast to a perpetual time taking buying stages because beforehand preparing of a purchase order paying little heed to the volume, value, size and significance of the item in question required on a more strictly manner.

Chandwich and Rajapal (1995) stress that electronic purchasing when complimented by web and extranet applications ensure availability to stock information bases particularly for large

clients. This can be accomplished just in view of how attainable electronic procurement facilities are influenced through examination being finished by web interface through the electronic data interchange applications.

In the worldwide market, companies are dynamic in areas of marketing, distribution and manufacturing system. All endeavours are coordinated towards guaranteeing items are conveyed with high level of customer satisfaction at the right quality, quantity, time, place and price. As indicated by Lenders and Fearson (1997), buyers can compare product features and prices at the internet and place orders and furthermore buy items online by means of the system. Suppliers and purchasers can obtain price quotation, determined availability of items in supplier's stock and transmit a purchase order, get a subsequent information about any adjustments in purchases requirement caused by schedule revision obtain service information and send letters and memorandum instantly. The mutual relationship that exists with suppliers is probably going to wind up the standard as opposed to the outstanding business relationship. Slocum (1995) expresses that life cycles of products are shortening new product development process. Lysons (2000) underlines that purchasers and sellers are associating their organizations with those of their suppliers so they can transmit information to spread up the entire trading system resulting into more productive use of assets and quicker response to customers. Communication stream among suppliers and purchasers guarantee effective, efficient and coordination across multiple zone and far flung geographical location. Needman and Dransfield (1995) is of the view that web-based purchasing is considered as fast and productive.

E- Procurement enable organizations to have more information which empower organizations to make purchasing efficient and effective. These systems may likewise keep the organizations updated with current product development consequently making organizations increasingly dependable in delivery. As per Hill (1997), suppliers and purchasing organisations can communicate to each other in real time, with no time delay which ultimately increased flexibility and responsiveness of the whole supply chain system. Wilson (1993) and Norton (1995) underline that linkage of computers of suppliers and purchasers/customers guarantee firsthand information for speedy decision making and the flow of information in such a manner that it is swift and noise free because of already established protocols among organization.

2.5.3 Barriers to E-Procurement Implementation

Steinberg (2003) states that Government e-procurement projects have been notoriously unsuccessful. This is so because various and successive governments encouraged the public sector to adopt the e-procurement applications and implement them though it is not running smoothly as expected. E-procurement development and implementation has not been as simple and straight forward as some of the solution providers of the software have suggested, nor has it necessarily brought the anticipated gains and savings to the organizations. Moreover, engaging suppliers of the smaller organizations in the process is also proving to be difficult and not cost efficient given the level of investment expected in terms of providing catalogue information to buyers and marketplaces using different technologies, platforms and business languages (OGC 2002). Birks et al. (2001) is of the view that e-procurement implementation success is closely related to early supplier involvement and it is important to demonstrate that, the proposed solution to the suppliers and discuss any necessary changes, issues, and concerns such as various options in developing and maintaining supplier catalogues is essential. Therefore, it is necessary to provide opportunities for the suppliers to table their responses which would permit the various procurement department supervise, monitor specific areas that needed improvement and possible adjustment. Many suppliers feel reluctant to transact business with the public entities because of the low motivation and benefit that they would derived in doing business with them. It is therefore important to educate both buyers and suppliers on the proper usage of e-procurement tools implementation. Effective communication between the buyers and suppliers on the e-procurement implementation is the key and surest way reduce cost associated with processing of document.

2.6 E-Procurement Assimilation

With the guarantee of enormously enhancing operational proficiency and improving organizational performance, enterprise resource planning (ERP) systems have been embraced by most of the large and medium organizations around the world. Sirkisoon and Shepherd (2002) directed a review to test the veracity of utilizing ERP of which 500 mid-to large-size organizations demonstrates that ERP infiltration was 67 percent and another 21 percent of the organizations were assessing the systems; 74 percent of makers and 59 percent of service organizations were either utilizing or actualizing ERP. Be that as it may, numerous ERP projects have fizzled and driven organizations to financial challenges (Miller 2000; Xue et al.,

2005). As per one estimate, the percentage of ERP implementations that can be classified as "failures" go from 40 to 60 percent (Langenwalter 2000).

The high failure rate of ERP projects can be generally attributed to the multifaceted nature of ERP systems. ERP systems effects on organizational procedures, structures, and even cultures are a lot more extensive and progressively significant (Robey et al. 2002; Soh et al. 2000) than less convoluted technologies. Usage of an ERP system involves unpacking the "best practices" embedded in the design of the software, possibly through various customizable configurations. The challenge of aligning the embedded business processes with the existing organizational processes puts ERP projects at considerable risk. Consequently, the result of an ERP project is highly dynamic and often a moving target: an early achievement could turn into a later failure and an early failure could transform into a later achievement (Larsen and Myer 1999). Since the potential business value of information technology (IT) applications cannot be completely acknowledged until they are widely acclimatized in an organization (Armstrong and Sambamurthy 1999; Purvis et al. 2001; Zmud and Apple 1992), achievement cannot be guaranteed until ERP assimilation is ultimately accomplished by organization.

IT assimilation is viewed as an imperative result in the endeavours of organisations to leverage the potential of information technologies in their business activities and strategies. Despite huge interests and investments in information technology, considerable diversity exists in how well organisations have been able to assimilate IT and leverage the business value of IT. The study draws evolving knowledge-based and resource-based views of the organisation to examine the influence of three factors on IT assimilation: (i) quality of senior leadership, (ii) sophistication of IT infrastructures, and (iii) organizational size. In this investigation, the researcher adopts the definition of assimilation by Purvis et al. (2001) as "the extent to which the use of technology diffuses across the organizational projects or work processes and becomes routinized in the activities of those projects and processes." This definition corresponds to the "shakedown" and "onward and upward" stages of the ERP life cycle model proposed by Markus and Tanis (2000). The key objective amid the post-implementation is to acclimatize the technical features of an ERP system into the business routines so that the expected benefits of ERP can be realized. At this stage, the contribution of the merchants is essentially brought down and the systems is considered formally "rolled out" for routine utilization by the operational-level users. Many of the extreme customizations such as process transformation and reengineering are finished at this stage (Luo and Strong, 2004). As the

underlying execution closes, organization ordinarily endeavour to guarantee that an adequate measure of information about the ERP system has been transferred from the vendors and consultants to the end users. Power users (users who are technically savvy about the ERP system) are identified to help their peers to adjust, and adequate training resources are resolved to fortify the changes (Somers and Nelson 2004). In any case, various hindrances could back off or even the assimilation of the ERP after the implementation. For instance, users may not understand the ERP system totally. Rather they may create and re-enact workarounds (Markus and Tanis 2000). These workarounds can then persist indefinitely (Tyre and Orlikowski 1994) even though they are recognized as inefficient. For instance, Boudreau and Robey (2001) portrayed how users in a state university continued to maintain the shadow systems and how power users found it difficult to unlearn their legacy systems after the implementation of an ERP system. Further, except if users are persuaded to adjust, they may continue to informally rely (sometimes exclusively) on consultants or power users for solving bottlenecks (Hirt and Swanson 2001).

It is additionally conceivable that the top executives promote an ERP project to satisfy shareholder expectations without being completely committed to acclimatizing the ERP systems within the organization (Chatterjee et al. 2002b). At the very least, it is even conceivable that an ERP system is terminated in the post implementation stage if not appropriately assimilated (Davenport 1998). In summary, ERP assimilation in the post implementation stage is fraught with vulnerabilities under which organizations are predisposed to look for arrangements from their institutional environments. Henceforth, institutional theory affords us a lens through which organizational behavior in assimilating ERP systems can be sensibly clarified.

Lack of organizational (internal) readiness has been shown to inhibit IT adoption in organizations where readiness is defined as the availability of needed organizational resources (Baura et al. 2005). However, in this study the emphasis will be concerned with the readiness of suppliers, since the success of an organisation's net initiatives is likely to be influenced by its partners' ability to conduct business electronically (Iacovou 1995). Authentication is the process of ascertaining the identity of a party that has sent or received a message, and/or determining that the message received is accurate (Yang and Papazoglou 2000). Authentication is a basic component of e-Procurement as it includes the electronic exchanges of huge number

of documents including purchase orders, request for quotation/tender and invoices. The questions such as who originated these messages, how the integrity in transmission and storage of these messages and their confidentiality will be guaranteed of, and why the originator expected to go into the coupling relationship are constantly imperative with respect to e-Procurement transactions. APCC (2002) proposes the organizations to address these questions and furthermore to dissect the probability and consequences of the risk associated with failure to properly authenticate a party to an online transaction, against the cost of implementing authentication. In any case, the need to give validation, and what level and sort of authentication is utilized, is an issue for trading partners to determine. In November 2000, Australian State and Territory governments agreed at the Online Council to use, where appropriate, Public Key Infrastructure certificates which comply with the Commonwealth's Gatekeeper framework (APPC 2002). The Gatekeeper framework provides a technology-neutral accreditation of digital certificate services and service providers.

The interoperability system depicts a base arrangement of approaches and benchmarks that lessens the requirement for trading partners to join several marketplaces by allowing them to interoperate using various technologies and allow seamless provision of information and services between Government agencies (AGIMO 2004). Interoperability is fundamental to direct procurement electronically between industry and government, and between agencies. As e-Procurement progressively centers on interorganisational communications and business transactions, the need to harmonize business models, processes, and representation formats rises rapidly.

Yang and Papazoglou (2000) note that transactions in the B2B e-commerce are usually long-lived propositions involving negotiations, commitments, contracts, floating exchange rates, shipping and logistics, tracking, varied payment instructions, exception handling, and customer satisfaction. Besides, interoperability with regards to such e-commerce propositions is driven by several factors including business process compatibility, adaptability of business process, leveraging legacy assets, support for business transactions; and, network security services. The sorts of atomic protocols associated with business transactions and thus with interoperability has been discussed by Tygar (1998). As indicated by the author, payment-atomic protocols affect the transfer of funds from one party to another whereas goods atomicity protocols allow an exact transfer of goods for money. Similarly, whereas deliver-atomic protocols allow both transacting parties to prove exactly which goods were delivered, contract atomicity protocols

are governed by ecommerce protocols that include the exchange of financial information services and the exchange of bills and invoices.

To advance network and business trust in the online environment, the Australian State and Territory Governments consented to build up a light-handed, technology-neutral legal framework to support the use of e-commerce. The Australian Government presented the Electronic Transactions Act in 1999 and the States and Territories have pursued with corresponding enactment (AGIMO, 2004). The Act removes existing legal hindrances that may keep an individual using electronic communications to satisfy obligations under Commonwealth law. States and Territory Governments have enacted, or are enacting, corresponding legislation dealing with electronic transactions in their own jurisdictions. This legislation assists in the successful implementation of electronic commerce in Australia. Legislation dealing with such issues as privacy, copyright, and fair trading is also relevant to the online environment (APCC, 2002).

Standards guide the trading partners in implementing interoperable e-Procurement technologies and manage G2B business-to-business exchange. Since the open standards use a common/general system architecture instead of the proprietary software to enable smooth business-to-business e-commerce transactions on the internet, it can integrate into the existing procurement systems (computerized) and IT infrastructure. The open standards also support simple or complex procurement and can link the variety of e-Procurement technologies and inventory systems implemented by the trading partners (Tian et al. 2000). Some of the key standards for data that can be used to support e-Procurement include Open Buying on the Internet (OBL) and Extensible Markup Language (XML). Other new and evolving standards include the organisation for the Advancement of Structured Information Standards (OASIS) proposed by the United Nations, electronic business Extensible Markup Language (ebXML), and the Universal Description, Discovery and Integration (UDDI) initiative (APCC 2002).

Security alludes to the confidentiality, integrity, access and availability of data during its transmission and its storage in all formats whereas privacy concerns the rights of individuals who may be concerned that the privacy of provided information may not be adequately protected (APCC 2002). The Internet offers easy communication between individual computers, but it also opens the likelihood of outsiders breaking into computer systems and

stealing valuable information such as credit card numbers. Any information transmitted over the Internet can be intercepted anytime if suitable security safety measures are not taken. Organizations, therefore, have a responsibility to ensure that trading partners maintain appropriate levels of security (AGIMO 2004). Like security, privacy is also related to confidentiality which refers to the use of encryption for scrambling the information sent over the Internet and stored on servers so that eavesdroppers cannot access the data (Yang and Papazoglou 2000). Since December 2001, Commonwealth privacy legislation has applied to both the public and private sectors and specified classes of business are required to comply with National Privacy Principles based on the Commonwealth Privacy Act 1988. By conforming to the requirements of Australian Standard AS4444 (Information Security Management) and AS4360 (Risk Management), or some similar public standard, trading partners will have greater confidence in each other's security (APCC 2002).

Assessing the suppliers' e-Business is vital for effective e-Procurement assimilation because of the dyadic idea of e-Procurement which must interface with the organization's suppliers. Obviously, regardless of whether an organization has the essential e-Procurement foundation to conduct procurement with the suppliers, an absence of availability on part of the suppliers will upset the assimilation of the e-Procurement.

The power of e-Procurement assimilation of an organization depends not just on its own endeavours to incorporate e-Commerce technologies in its procurement functions, yet in addition on the availability of its suppliers and trading partners to engage in electronic interactions and transactions. Suppliers might be worried about the technical boundaries and the investment required to e-empower their procedures. Moreover, they may need to be educated on the new medium of business and their security concerns must be addressed. Barua et al. (2005) contend that supplier readiness ought to be considered as an empowering influence that requires a proactive commitment of an organization's resources even though it is regarded as an external to the organization. Barua et al., (2005) recommend the organizations to structure certain impetus systems, for example, subsidy or guaranteed business to encourage business partners to get connected. The authors further propose to put resources into assets to help increment the capacity of their partners to do business electronically, such as providing training.

2.6.1 Top Management and IT Assimilation

While institutional hypothesis predicts institutional isomorphism, truly, organizations have exhibited diversity concerning the level of ERP assimilation under a comparative institutional condition. To represent this diversity, we apply a human office point of view and agency perspective and posit that the top management members are the essential human agency that makes an interpretation of external impacts into managerial activities, for example, changing organizational structures and setting up strategies dependent on their perceptions and beliefs of institutional practices. Top management's limit traversing job has been found to altogether influence IT project performance by importing external knowledge and integrating internal knowledge (Mitchell 2006). In the institutional condition, top managers are not just impacted by others' decisions of IT products or services or of influential consultants, they may likewise benchmark the business benefits they get from their ERP utilization against those inferred by different organization. Thus, it can be viewed that institutional forces may not directly affect ERP assimilation in organizations, rather their impact on ERP assimilation is acknowledged by the actions of top management. That is, it very well may be induced that institutional powers' effect on ERP assimilation is intervened by top management. To completely clarify the degree of ERP assimilation, the collaboration between institutional powers and top management should be considered. It might be contended that it is the operational level employees who need to adjust their work procedures to absorb a new IT artefact. Notwithstanding, past research recommends that top management needs to perceive and accept the accountability for both the technical and organizational changes (Leonard-Barton 1988). To be sure, literature on innovation assimilation largely views top management as the agency responsible for changing the norms, values, and culture within an organization, and in turn, this enables other organizational members to adapt to the new technology artefact. The norms, values, and culture engendered by the top management permeate to the individual level in the form of procedures, rules, regulations, and routines, which serve as powerful templates that guide individual behaviour (Purvis et al. 2001).

In contrast to the relative absence of hypothesizing about the role of external institutions in IT assimilation, a broad base of literature provides theoretical support for the role of top management in driving IT usage within organizations (Reich and Benbasat 1990). For example, prior studies demonstrate that formal monitoring of progress (Garrity 1963) and incentives (Bhattacharjee 1996) result in increased usage of IT. For large scale systems, top management

is especially critical for forging partnerships among functional area executives (Doll and Tonderemse, 1987). Earlier investigations additionally find that top management influences progressive utilization of IT organizations (Jarvenpaa and Ives 1991), adds to assimilation of CASE instruments (Purvis et al., 2001), expands the assimilation of web technologies (Chatterjee et al., 2002a), and can reverse failing implementations (Akkermans and van Helden 2002).

2.6.2 Top Management Beliefs and Participation in Assimilation

To build up a refined comprehension of the role of top management, the investigation expand on two phases in the process by which top management bolsters an organizational initiative, to be specific, belief and participation. Following Jarvenpaa and Ives (1991), the utilization top management beliefs (TMB) and participation (TMP) is relevant. TMB alludes to a subjective psychological state regarding the potential of ERP, while TMP refers to the behaviour and actions performed to facilitate ERP assimilation. To start with, past research indicates how the external environment influences the beliefs of top management. For instance, top managers create "belief structures" to manage concepts and stimuli from the environment and use these beliefs as a basis for inferences (Walsh 1988). Second, literature suggests that top managers' beliefs guide their managerial practices. Srivastava (1983) declares that organizational strategies, decisions, and behaviour are guided by top managers' psychological image of a desired future organizational state. As indicated by Hambrick and Bricklayer (1984) organizational decisions are an impression of the top management's values and cognitive bases. Along these lines, the positive beliefs of top managers about the value of information systems result in certain managerial actions intended to assimilate such systems. For example, Chatterjee et al. (2002a) express that "through their beliefs, top management can offer visions and guidelines to managers and business units about the opportunities and risks in assimilating the Web technologies". Though top support is found to a useful contingent factor of IS assimilation, this study does focus on it because the study focuses on theories that influence assimilation.

2.7 Tendering Method/Procedure

Burger and Hawkesworth (2011) point out that the choice of procurement method will have significant effect on the value for money for the buying organization. Ghana's public sector procurement is characterized by several methods depending mainly on the amount involved or

the threshold, capacity of local/domestic suppliers, the number of suppliers available and the urgency of need. Ordinarily however, the threshold determines the method of procurement. The methods of procurement include Price Quotation, Restricted Tendering (RT), National Competitive Tendering (NCT), International Competitive Tendering (ICT), and Single Source and Sole Source (SS). The most preferred method of procurement in the public sector is competitive tendering using International Competitive Tendering or National Competitive Tendering. However, the use of alternative methods of procurement is limited to the provisions stated in Part IV of the Public Procurement Act (Public Procurement Act, 2003, Act 663).

2.7.1 National Competitive Tendering (NCT)

National Competitive Tendering is most often appropriate for procurement of lower value where the nature or scope of goods, works or technical services to be procured are not likely to draw foreign competitors to also compete. NCT is also used when a procurement entity can provide justifiable reasons to restrict tendering to domestic suppliers and contractors. The thresholds prescribed in the Public Procurement Act 2003, Act 663 as amended for the procurement of goods, works and technical services using the National Competitive Tendering method is unlikely to attract foreign or international competition. The procurement entity often states in the tender document that tenderers must quote in the local currency and payment will be made in local currency. Invitation to tender is often placed in local newspapers to attract local companies.

2.7.2 International Competitive Tendering (ICT)

International Competitive Tendering is a method of procurement appropriate for procuring goods, works and technical services that are high in value and complex in nature and not likely to attract local competition. The ICT method of procurement is often used where local organisations do not have the capacity to tender due to the quantum of money involved in executing the contract. This method of procurement is also used where foreign organizations are invited to tender because effective competition cannot be attained using only local companies. Invitation to tender is often placed in widely circulated newspapers to attract foreign competition. Tenders are quoted in any convertible currency or that stipulated in the tender document by the procurement entity (Public Procurement Act 2003, Act 663).

2.7.3 Restricted Tendering (RT)

Restricted Tendering is a method of procurement where procurement entity shortlists pre-registered suppliers or contractors who can execute the contract and subsequently seeks approval from the Public Procurement Authority (PPA). The approval is sanctioned by the PPA Board subject to the procurement entity's reasons for application and what is stipulated in the Act 663 as amended. This method is appropriate where requirements or goods, works and technical services to be procured are of a specialized nature or has requirements of public security or public safety and makes an open tender not appropriate and practical. Sometimes, due to time constraint and the urgency of the items to be procured, restricted tender is desirable. When potential suppliers or contractors are limited or when an open tender fails, restricted tender is used (Public Procurement Act, 2003, Act 663). After approval has been sought from PPA, the approved contractors are invited and subsequently issued with restricted tender documents. The evaluated tenders are forwarded to the Public Procurement Authority for final approval. The procurement entity then posts a notice of the restricted tender award to the Public Procurement Bulletin to ensure fairness and transparency.

2.7.4 Two –Stage Tendering

Two-stage tendering procurement method is often used by organizations when procuring works and technical services. This method is not frequently used by procurement entities and often used when a procurement entity wants to enter for experiment, research and development. This is to attain most suitable response to the procurement needs. The first stage of this procurement method is where the procurement entity invites suppliers or contractors to submit their tenders which relate to the technical and quality requirements of the goods, works or services. The supplier or contractor also states the technical and professional qualifications and competence of the staff that are to perform the contract. The procurement entity and the supplier who have been selected may engage in negotiations at this stage with regards to any part of their tender. The proposal for price is not required at the initial stage. The procurement entity now requests from the selected suppliers or contractors to submit their final tender which now includes prices. The price is now evaluated to select the most responsive evaluated tender (Public Procurement Act, 2003, Act 663).

2.7.5 Single sourcing

Single sourcing is a method of procurement where a procurement entity award contract to a contractor or supplier without going through the competitive process. Approval of the single

source procurement is subject to the guidelines issued by the Public Procurement Board. This method of procurement is applicable when a supplier or contractor has exclusive rights regarding the goods, works and services and there are no alternatives, when there is an urgent need for the items and when there is time constraint. It is also applicable when the procurement concerns national security or when a supplier or contractor has performed a contract and additional works, or supplies are needed for that contract. The procurement entity then invites price quotation or proposal from a single contractor or supplier who has proprietary techniques that can only be obtained from that source (Public Procurement Act, 2003, Act 663).

2.7.6 Request for Quotation (RFQ)

Request for quotation is a procurement method where a procurement entity invites quotations from three or more suppliers or contractors and selects the most responsive quotation of supplier to perform the contract. Goods, works and technical services procured using this method are readily available on the market and requires less time in procuring them. Procurement made using this method is approved by the head of entity. A request for quotation document is prepared which has shortlisted suppliers who are invited to respond to the quotation within a time frame given by the procurement entity. The quotations received are then evaluated and contract awarded to the responsive supplier. Prior to the evaluation of bids or quotations, the procurement entity is not required to negotiate with the supplier on the bid submitted.

2.8 Principles of Public Procurement

Value for money (VFM) is one of the underlining standards of public procurement. Raymond (2008) express that VFM is the most imperative standard of obtainment. As indicated by Bauld and McGuinness (2006), VFM in public sector includes thought of the commitment to be made to propel government strategies and needs while accomplishing the best return and execution for the cash being spent. Cummings and Qiao (2003) demonstrated that to acquire VFM, the government is at liberty to think about other criteria than the most minimal cost; for instance, technical capacities, capabilities of key faculty, and past execution records in granting contracts to potential suppliers. Palmer and Butt (1985) distinguished boundaries, for example, feeble overseeing bodies, governmental issues, tradition and absence of education and training programmes which should be vanquished to accomplish VFM.

Another vital standard of public procurement is ethics. Atkinson (2003) expressed that purchasing professionals are held to higher norms of moral conduct than individuals in different professions, yet some do not comprehend what is anticipated from them. It is imperative that employees are sufficiently educated in such issues with the goal that it does not prompt genuine outcomes like breach of codes of conduct and its repercussions (Raymond 2008). Atkinson (2003) further noticed that there are around 500,000 professional purchasing individuals in the United States and just 10% of these have been members of a professional Supply Chain Management Association which trains individuals in buying morals, and the rest are not by any means mindful that there are moral and legitimate principles engaged with procurement.

A public servant has an obligation to report any unscrupulous lead by an associate, a bidder or a supplier to his superiors or to the auditors (Manuals – Public Procurement Act, 2003 (Act 663), Ghana). Ethical behaviour must be advanced and bolstered by suitable systems and procedures, but systems and strict adherence to techniques alone cannot make a moral and responsible procurement function. Public servants associated with procurement are obliged to pursue the Civil Service Code and the controls administering public procurement. Also, it is imperative that all procurement exercises are done in a way unquestionably sound, with complete fairness and with no special treatment. The procurement procedure must permit suppliers, contractors and experts to go after business on a reasonable premise. Public officials associated with the procurement function, are responsible for protecting the integrity of the procurement process and maintaining fairness in the Government's treatment of all suppliers, contractors and consultants.

Competition as one of the principles of public procurement is how most goods and services are procured (Raymond 2008). It is a method by which purchasers make the best utilization of aggressive market powers to get the best offer from the market at a point in time. Competition happens in the offering procedure as offers are put together by different tenders for thought. Likewise, competition happens in issues, for example, supplier's believability in completing past contracts of a similar sort, the cost and the most aggressive bidder would be granted the agreement (Raymond 2008). Erridge (1999) trusts that aggressive offering would stay away from allegations of bias and misrepresentation and that the openness of the system would urge more suppliers to partake and that expanded challenge would help decrease costs, enhance quality and lead to more noteworthy intensity among suppliers.

Transparency is another imperative rule in public procurement. Transparency in procurement implies receptiveness in the offering procedure. This includes having respect for the procurement laws, strategies and practices in the nation. Transparency provides an assurance for both domestic and foreign organisations that contracts will be awarded in a fair and equitable manner. As indicated by Smith-Deighton (2004), transparency expects governments to hold fast to higher principles of conduct guaranteed to be available to investigation. Transparency along these lines is a basic part of guaranteeing responsibility and limiting corruption. This has gained prominence in OECD nations and is especially connected with the ascent of the administration plan as transparency is a centre administration esteem (Smith-Deighton, 2004). In all business sectors, an absence of transparency in the feeling of nonappearance of data on guidelines and practices could work as a boundary to exchange and may influence outside providers more than nearby ones (Arrowsmith 2003).

Accountability is the principle in public procurement which comes in to play at both the national and international levels (Raymond 2008). The public, be that as it may, is additionally requesting more noteworthy accountability and better service (Gunasekaran 2005). The Government requires that: (i) every public authority and experts of procurement will be considered responsible and in charge of their activities; (ii) all suppliers, contractors and consultants will be dealt with reasonably and given equivalent chance to get contracts with the Government; (iii) procurement will be done in the most effective way, maintaining the standards of significant worth for cash, upholding the principles of value for money, transparency and fairness; (iv) funds will be used solely for the purposes for which they have been entrusted; (v) appropriate procedures of the Government or the Development Partners are applied; (vi) all transactions are properly authorized and fully supported by written records; (vii) value for money can be demonstrated by comparison with market rates; and (viii) an appropriate Code of Ethics is followed by all staff involved in the procurement process (Public Procurement Manual 2003).

Competition: Raymond (2008) explains competition as the ways in which procurement organizations take advantage of the competitive market forces to achieve, at a point in time the best offer from the market. Competition is often seen in the tendering process as tenders are submitted by different suppliers or tenderers for consideration and evaluation. Raymond (2008) opined that credibility of suppliers in performing similar tasks or contracts, price and award of contracts to the most competitive tenderer are all means by which competition occurs. Erridge

(1999) believes competition would aid in the reduction of prices, quality improvement and greater competitiveness among suppliers as competitive tendering would eliminate allegations of fraud and favouritism and the openness of this method of procurement inspire more suppliers to participate and increase competition.

Transparency: Transparency is one of the essential principles of public procurement. In the tendering process of procurement, transparency means openness and includes having respect for the procurement policies, practices and procurement laws of the procurement organization. As organizations, both foreign and local which bid for contracts are assured that contracts will be awarded in an equitable and fair manner, transparency provides that assurance for them. Transparency requires that government organizations adhere to higher ethics and values of conduct by making sure that their conducts will be subject to examination (Smith-Deighton 2004). Transparency has gained prominence in Organizations for Economic Cooperation and development (OECD) countries as it is an important aspect of curtailing corruption and ensuring accountability and is predominantly linked with the increase in governance agenda as transparency is an essential governance value (Smith-Deighton 2004). According to Arrowsmith (2003), a lack of transparency in all markets in the sense of lack of information on practices and rules could function as a blockade to trade and may affect foreign suppliers more than the local suppliers.

2.9 Tendering Process

Generally, a tender process is based on several inter-related steps which start with planning and defining (which includes a needs assessment), planning and budgeting, the definition of requirements and specifications, and the choice of procedures. This is followed by finding a supplier, which includes pre-qualification, inviting or calling for tenders, evaluation or assessment of tenders received, and awarding them. The post-award actions include contract management, order and payment. The final stage concerns the management and monitoring of the contract and the administering of payments as and when these become due (Mantzaris 2014).

The entire process is grouped into pre-tendering, tendering and post-tendering phases (OECD, 2009). The *pre-tendering phase* consists of four main steps: a needs assessment, planning and budgeting, the definition of requirements and choice of procedure. Most procurement activities

start with the evaluation of the needs and requirement of the buying organisation (Koppelman 1998). Procurement planning is the primary function that sets the stage for subsequent procurement activities which fuels and then ignites the engine of the procurement process (Basheka 2009). Procurement planning has been explained as the procedure adopted by organizations, Ministries, Departments and Agencies (MDA's) of the government to arrange their procurement processes for a period, normally spanning a fiscal year (Agaba and Shipman, 2007). Procurement planning is an essential step in the procurement process, because it helps procurement agencies to decide what to buy, when and from what sources (Wheatland 2015). Another important activity of the pre-tendering phase is the specification of requirement. Specification is a description of how the finished product should perform over time (Transportation Research Board 2005). The needs assessment, planning and budgeting and specifying procurement requirements lead the entity to choose the best procurement methods and procedures.

The *tendering phase* comprises information solicitation through request for quotation and proposal and invitation to bid, evaluation of bids and award of contract (OECD 2009). Solicitation is a phase of the procurement process in which the business actively solicits offers from competing suppliers through an invitation to bid or request for proposals. Solicitation documents identify the purchase, purchase requirements and outline a process each supplier must follow when submitting a formal bid or proposal. The information solicitation procedures include appropriate methods for evaluating and selecting awardees and possible contracts (UN Procurement Practitioner's Handbook 2006). Evaluation of bids should proceed the information solicitation and should go beyond simply the price, and other criteria should be made clear prior to the evaluation process. The evaluators should be appropriately competent and have the required expertise to assess the bids. The evaluation and assessment of the bids should be quick, and the result or decision should be made known as soon as the evaluation is complete (Stock and Lambert 2009).

Lastly, *post-ordering phase* is made up of contract management and payment. More emphasis could be placed on the post-tendering phases to ensure the integrity of the entire procurement process and to foster delivery at the right time and quality to avoid budget overruns (OECD 2009). Contract management is the process of actively managing contract implementation to ensure the efficient and effective delivery of the contracted outputs and/or outcomes, and which

enables a contracting organisation to maximize value for money (World Bank 2018). The focus of contract management is on the activities that are undertaken during the contract execution/implementation phase, following the award of contract. Contracts are performed to meet client's specifications and must be paid for. The mode of payment for contracts ranges from a simple method to that of major methods. The type of payment method is dependent on the type of contract in question. The time of payment is crucial in public procurement because a delay in payment may influence the total cost, stakeholder satisfaction and expectation.

2.10 Value for Money

The optimum balance of benefits and costs based on total cost of ownership is because of value for money (VFM). According to Civil Service College (2010), value for money does not automatically mean that the lowest tenderer must be awarded a tender. Raymond (2008) states that the most important principle for procurement is value for money. Value for money in the public sector encompasses consideration of the input to be made to promote priorities and policies of government and at the same time attaining the best performance and returns for money spent (Bauld and McGuinness 2006). The government has the authority to sometimes consider certain criteria other than price such as technical capabilities and specifications, qualifications of important personnel and the past performance of potential suppliers in the award of contracts if it wants to achieve value for money (Cummings and Qiou 2003). Challenges such as weak governing bodies, traditions, politics and lack of training and educational programmes need to be eliminated or dealt with to achieve value for money (Palmer and Butt 1985).

An obvious obligation to ensuring the best results possible are attained from the money spent is referred to generally as value for money. According to Barnett et al. (2010), the term value for money is used by the UK government to reveal a concern for more accountability and transparency in the disbursements of public funds and achieving the maximum returns from the available resources. Clearly defined relevant benefits, on time delivery and following lowest whole life cost are how the value for money can be achieved in public procurement. Also, elimination of waste and encouraging competition, accountability and transparency during the tendering process are essential conditions to achieve value for money. Value for money can be defined as the judicious, efficient and economic use of public resources at a

realistic cost. Achieving the lowest initial price is not value for money. However, it is the best blend of quality and whole life costs that make the buyer satisfied.

In view of the widespread perception of corruption and inefficiencies in the government sector and the need to instil trust in the procurement system, the government of Ghana, in discussion with some development partners has recognized the public procurement system as an area that needs critical consideration. A study conducted by the World Bank in 2003 reported about 50%-70% of national budget being used for procurement of goods, works, technical services and consultancy. To a country facing budget deficit and challenges in economic development, an effective and efficient public procurement system will ensure value for money in the public sector and government spending.

2.10.1 The nature of value for money

In the public sector, value for money comprises of the consideration of the input to be made to promote government and private policies and priorities while attaining best returns and performances on the money spent (Bauld and Guinness 2006). This is an indication that public organizations may decide to award contracts based on other criteria other than the lowest price. According to Raymond (2008), whole life cycle cost is one of the factors considered.

In the public sector, the procurement of goods, works, technical services and consultancy must be based on the assessment of value for money and reviews having regard for regularity and propriety. According to World Bank (2003), value for money is the best blend of whole life costs and quality and not just achieving the lowest initial price.

Behan (1994) elaborates that value for money is how much it costs to own and use a good or for a service to be rendered. Barnett et al. (2010) in their research on value for money found out that in spending public funds and obtaining maximum returns from resources available, value for money must reveal the concerns for accountability and transparency.

Batho Pele Handbook (2007) indicates that value for money is attained when public procurement is performed efficiently and economically. To achieve value for money, government organizations are mandated to familiarize with creative ways to streamline processes and eliminate uneconomical expenditure and inefficiency to promote a prolific use of resources in public procurement. There are three primary elements of value for money namely economy, efficiency and effectiveness and known as the 3Es (Batho Pele Handbook 2007).

Economy: Economy refers to the measure of how precisely a planned budget transmits to an actual spend and is also used to procure visibly the best tangible and intangible assets and the best human resources. This primarily shows whether suitable accounting and procurement procedures are in place for payment and transfer of funds and provides room for adjustments that can be justified when there are changes in circumstances. While adhering to procurement rules, procedures are processes, the budget is said to be spent with economy if planned budget equals actual spent or all the planned spending is achieved. Inaccuracy between the planned budget and actual spend often attracts attention to issues of planning as well as transfer and payment processes but might also attract attention to challenges with respect to capacity, error and fraud. The variance in this case should not go beyond 10%.

Efficiency: Efficiency is an operational concept that reflects how accountants perceive the idea of value for money, whereby the best attainable relationship is sustained between actual infrastructure and service provided and the prospective that could be carried out. The budget's output efficiency is broadly judged qualitatively by the degree to which specifications are attained and supplied at the right time. Efficiency is 20% when it takes 15 years to deliver that which was planned for to be delivered or supplied in 3 years according to the delivery schedule. The efficiency rate is 80% if the work plan of 16 out of 20 items is fully completed. Efficiency is 50% if it takes twice as long to deliver.

The ratio of the output to the extreme likely output is a quantitative measure of technical efficiency of the budget output. In a given time, if 100 units can be delivered per dollar of spend and only 80 units are provided, 80% is said to be the efficiency. If the work plan provides only 20 work items and 25 are possible, then is said to be 80% the efficiency rate. Scale efficiency measures can also be computed. These show if a resource development programme can be formulated that leads to output development faster than the rate of development of the resources. There is a signal that scale efficiency occurs if the real time value of each input increases by 1% and causes the real value of all output to increase by 1.2%. It would be necessary to ensure that the increment of output is not allocated to external factors but appropriately allocated to the inputs.

Effectiveness: Effectiveness is a strategic concept that necessitates the best likely relationship between spends and the benefits it produces over a period of 3-5 years for the public. The degree to which the original problem has been resolved which later transmits to whether funding goes to government task with the maximum importance is how effectiveness of impact

is measured. This can only be considered adequately if the total context of government spending is taken into consideration. For instance, funds are allocated to be spent on needed infrastructure for a tourism development project envisioned to raise the tenure rate by 50%. If the tenure rate is raised by 50%, the effectiveness of the budget is a 100%, and if it was raised by only 10%, the effectiveness impact of the budget is a 20%. In the same way, if an athletic facility is constructed and then used only 50% of what was intended, the effectiveness of the budget has 50% impact. Otherwise if a certain social group is ear marked for sponsored employment under the condition that the recipients must go to school while being employed, then if 20% of the total number of participants in the social group received the assigned benefits, effectiveness is also measured at 20%. According to the government standards, if funds are spent to advance educational performance, then matching actual performance against the list of criteria will show if the spend is 100% less or effective.

Taking into consideration the government's limited resources available, ensuring value for money in procurement is essential to guarantee the optimum use of scare budgetary resources. In procurement, value for money is the main driver. This means procuring goods and services of good quality and meets specifications at the lowest whole life cost. Where a good or service is selected and does not have the lowest whole life costs, the additional "value added" gains must be justified and flawless. Assessment of supplier offers should be steered only with regards to sanctioned set of evaluation criteria, which must be pertinent to the focus of the contract, and any "added value" that secures a higher price must flow from these distinct set of criteria for evaluation (Office of Government 2007).

How much it costs to own and use a purchased good or service points out the actual value for money (Behan, 1994). According to Barnett et al. (2010), a concern for more accountability and transparency in public funds expenditure and gaining maximum gains from the existing resources shows what value for money reflects.

Value for money is attained when public organization's procurement is executed efficiently and economically (Batho Pele Handbook 2007). To achieve value for money, government organizations are expected to familiarize with creative ways to simplify processes and eliminate expenditures that are wasteful and inefficient to encourage valuable use of resources in public procurement. There are three elements of value for money namely economy, effectiveness and efficiency known as the 3Es (Batho Pele Handbook 2007). Economy

discovers how specific inputs are attained at the right time and at the lowest cost. Efficiency on the other hand is how effectively inputs are transformed into outputs. Thus, maximum output with minimum cost. Effectiveness is the degree to which an output attains the anticipated results (Batho Pele Handbook 2007).

Therefore, in public procurement, the attainment of the lowest whole life cost and evidently distinct benefits, purpose of goods, works, consultancy and technical services procured within budget and scope and of the right quality and at the right time is referred to as value for money.

The design for value for money is based on World Bank definition, which is whole-life cost and quality (World Bank 2003) with duration of contract duration (measured as the time of contract award to closure).

2.10.2 Whole Life Cost

According to CIPFA (2011), whole life costing is a management tool and an investment appraisal that evaluates an asset's total cost over its whole life. Whole life cost takes into consideration the initial cost, operational cost, maintenance cost, cost of repairs, cost of upgrade and the disposal cost of the asset.

In public contracts, there are three types of costs, namely, the planned cost (as stated in the procurement plan), the contract sum (as provided by the winning tenderer) and the actual cost (as the total measured cost at the end of the contract). The first two cannot be said to as the true reflection of the procurement cost since there are always subject to variations. Therefore, the total measured cost at the contract becomes the true cost and the predicted additional running cost incurred during the life cycle of the project plus the disposal cost becomes the whole-life cost.

2.10.3 Quality Dimension

The quality dimension is the measure of (1) completeness and (2) fitness for purpose (SPFM, 2004). The Scottish Public Finance Manual (SPFM) defines quality to mean only fitness for purpose but this study has added two additional dimensions; completeness (meeting user's requirements), durability and duration from practitioners' perspective. The addition is motivated on the premise that there could practically be a difference between meeting user's requirements and fitting the purpose. A project may meet user's requirements but that does not

mean it will fit the purpose. In addition, a purchase may meet user's requirements and fit the purpose but may not last to cover the intended duration (life span).

2.11 Factors ensuring value for money in public procurement

The objective of every buying organization is to procure goods of the right quality, ensuring cost effectiveness by buying the right quantity, achieving the lowest cost by procuring at the right price to be delivered at the right time and at the right place. The procurement of works and technical services are expected to be procured from a reliable source. All these are to be ensured to achieve value for money as well as the objectives of the organizations. To achieve the objectives of a good procurement system, public procurement principles are enshrined in the procurement manual to promote professionalism, transparency and ethics in the operations and management of procurement and the disposal of assets (Public Procurement Manual and guidelines 2007). Other principles include competition, efficiency, fairness, accountability, economy and value for money.

It is important that the procurement system ensures value for money in the procurement of goods, works, consultancy and technical services. Through an open tender, the procurement system's objectives are to procure goods, works, consultancy and technical services at the right price, right place, right time, right quality and the right quantity. Public institutions are trusted with public money to offer services to the public and for that reason all procurement activities must be conducted in an open and transparent manner. Information on procurement activities must be made available to stakeholders and the public as a means of auditing and controlling all activities associated with procurement. The rules that govern public procurement must be available to all interested citizens. All contracts awarded to suppliers and contractors are posted on the Public Procurement Authority's website to ensure transparency. Public procurement practitioners are expected to take responsibility for their actions and to enforce and obey all procurement rules. They must be held fully accountable and responsible for their actions as they are involved in and have authority to exercise over those functions. The funds entrusted to public procurement professionals are to be used for the purpose for which it was intended.

Procurement practitioners are expected to uphold all ethical standards and codes. Revealing confidential information to tenderers, discriminating against tenderers, requesting money from suppliers, destroying official procurement document and discriminating against suppliers are unethical activities that are in violation of the Code of Ethics that governs the procurement

activities. Procurement professionals who violate the code of ethics are sanctioned for non-compliance with the ethical standards. Depending on the violation of the ethical codes, procurement practitioners who are found culpable are dismissed, sanctions as specified in the Act are applied to professionals who act in negligent or irresponsible manner while in other cases, remedies are sought in the court of law.

The relationship between goods and services produced and the resources used to produce them is known as efficiency (ACCA 1999). Ensuring that the procurement system operates in a rapid and simple manner producing results without delays also results in efficiency. An efficient procurement operation produces maximum output for any given resources of inputs. Every procurement operation aims to achieve fairness that helps in the efficient use of state resources in a judicious manner. Procurement professionals must act fairly in all procurement activities with the public and suppliers to gain the trust of all stakeholders within the procurement system. Procurement practitioners are expected to treat all suppliers equally and apply the same rules to them.

One of the most important principles in attaining value for money is competition. Competition among tenderers helps organizations to achieve better pricing. According to Kee and Forre (2002), competition produces an efficient delivery of goods and services. Organizations attain value for money through competition using open tenders which allows several suppliers to bid for contracts and the best selected from among the many bids received.

The role of procurement practitioners in the public institutions is critical to the economic development of the nation and hence the need to employ responsible, educated and experienced officers who can better make informed decisions about the procurement function (Public Procurement Board 2007). This supports the argument of Leenders et al. (2003) that the procurement office is strategic within the organization as it relates with other functions within the organization and acts on behalf of the organization with diverse groups and suppliers. Procurement practitioners are expected to act in a professional manner and safeguard all information regarding the procurement processes as they are privy to information about the organization and the various suppliers. They are not to use the information they have in their favour or discriminate against other suppliers.

The terms and conditions under which organizations obtain material and human resources of the right quality and the right standard at the lowest possible cost is known as economy (ACCA 1999). The purpose of the procurement function is to attain best value for the money spent in not just the price but also negotiate on the right quality of goods and services for the organization.

2.12 Summary of Chapter

This chapter reviews the literature of key constructs in the research model, notably information systems adoption and assimilation, electronic procurement assimilation, the public procurement methods/procedures and process and value for money. The rest are absorptive capacity and institutional theory - the two theories adopted as antecedents in electronic procurement and tendering process. The next chapter presents the theoretical justification of the study. It conceptualizes the research model exploring the antecedents and outcomes electronic procurement assimilation and the procurement (tendering) process. It also explains the relationships among the constructs and finally, formulation hypotheses to drive the research.



CHAPTER THREE

THEORETICAL FRAMEWORK AND HYPOTHESES

3.1 Introduction

This study, based on the literature review and the propositions made, has developed a conceptual model, and seeks to find answers to and establish the relationships among institutional absorptive capacity, institutional pressure, the procurement process, e-procurement assimilation and value for money. The study mainly focused on public sector organisations, to whom the Public Procurement Authority, the regulator, is promoting the adoption of E-procurement platform for all or some of their procurement activities. The main purpose is to assess the effect of public sector organisations' capacity to assimilate the electronic application in their procurement function and how this translates into achieving value for money in public procurement discourse. The research framework is based on existing theories and models; of which some are modified to suit context of the study. The institutional absorptive capacity as antecedent of assimilation is based on absorptive capacity theory by Zahra and George (2006) and Todorova & Durisin (2007), and in context Kauppi et al. (2013). Assimilation, on the other hand is based on the work of Fichman and Kemerer (1997) and Rai et al. (2009) while value for money is based on the work of Rutter and Potter (2003), Raiser (2014), and World bank (2003). This section is organized into three parts; the first part presents the key theories underpinning the study while the second presents the theoretical links among the constructs. The final part presents the conceptual framework, shows the relationships and presents the hypotheses of the study.

3.2 Theories and Concepts

The key foundation of this theoretical framework comprises of three elements: institutional absorptive capacity, influence mechanisms and information systems assimilation in the procurement function. Information systems literature offers two distinct influences on IT assimilation – 1) assimilation driven by internal expertise and learning capability (absorptive capacity) and 2) assimilation driven by external institutional pressures (influence mechanisms) (Saraf et al. 2013).

3.2.1 Absorptive Capacity

Absorptive capacity was first introduced in management literature by Cohen and Levinthal (1990) who define it as the ability to recognize the value of new information, assimilate it and applying it to commercial ends. To them, absorptive capacity has three dimensions: recognizing the value of external knowledge, assimilating and applying it. Zahra and George (2002) later reconceptualised the original construct as acquisition, assimilation, transformation and exploitation. The first two dimensions of Zahra and George model are categorized as potential absorptive capacity and the latter two as realized absorptive capacity.

Table 3.1 Construct for Absorptive Capacity

Measure	Definition	Literature
Acquisition	Ability to locate, identify, value and acquire external knowledge that is critical to its operations.	Lane and Lubatkin (1998), Zahra and George (2002), Liao et al. (2003)
Assimilation	Capacity to absorb external knowledge. I. E. Processes and routines that allow the new information or Knowledge acquired to be analysed, processed, interpreted, understood, internalized and classified.	Szulanski (1996), Zahra and George (2002), Canison and Fores (2010)
Transformation	Capacity to develop and refine the internal routines that facilitate the transference and combination of previous knowledge with the newly acquired or assimilated knowledge	Kogut and Zander (1992), Van den Bosch et al. (1999), Jimenez-Barrionuevo, Garcia-Morales and Molina, (2011)
Exploitation/ Application	Capacity based on routines that enable organisations to incorporate acquired, assimilated and transformed knowledge into their operations and routines to create new operations	Lane and Lubatkin (1998), Zahra and George (2002)
Management competence	Knowledge in negotiating and making business Decisions, dealing with new technologies, and dealing with human resources	Tu et al. (2006). Mata et al. (1995)
Buyer competence	Knowledge of buyers in relation to different aspects of the business, levels of job competence, and education	Tu et al. (2006), Kauppi et al. (2013)
Communications climate,	The atmosphere within the organisation that defines accepted communication behaviour.	Tu et al. (2006), Kauppi et al (2013)
Communications network	Describes communications network as the scope and strength of structural connections that join flows of information and knowledge between different organisational units.	Tu et al. (2006), Kauppi et al. (2013)

Knowledge scanning	An organisational mechanism that enables organisations to identify and capture relevant external and internal knowledge and technology	Tu et al. (2006), Kauppi et al. (2013)
User competence	User's potential to apply technology to its fullest possible extent to maximize performance of specific job tasks Total set of knowledge, technology, skills and attitudes that function as action characteristics of an organizational member who can accomplish tasks in an outstanding manner in a business environment	Marcolin et al. (2000) Yoon (2009)

Several other authors later acknowledged the deviation of absorptive capacity from the original intent. Lane et al. (2006) recognized that the study of absorptive capacity has undergone an inappropriate deviation from the original purpose and identified some critical assumptions to explain the developments since 1990. They argue that absorptive capacity enables organisations to predict the nature of technological advances and acknowledged the efficiency view by Zahra and George. In their attempt to revisit the original intent of absorptive capacity, Todorovan and Durisin (2007) criticized the exclusion of value recognition from the reconceptualization of Zahra and George and suggested four dimensions of absorptive capacity: recognition, acquisition, assimilation or transformation and exploitation. They further proposed the directional effects of these dimensions.

Volberda et al. (2010) proposed an integrative framework based on Zahra and George's model. The main focus is the interorganisational and management antecedents of absorptive capacity as important drivers of organizational absorptive capacity, which include organizational forms, facility for actual communication, incentive structures and informal networks.

Since 1990, absorptive capacity has been modelled by various authors on components, antecedents, contingent factors and outcomes. All the models consider assimilation and application (exploitation) as main components of absorptive capacity (Cohen and Levinthal 1990; Zahra and George 2002; Lane et al. 2006; Todorovan and Durisin 2007 and Volberda, Foss and Lyles 2010). However, Zahra and George (2002) still maintain acquisition as a key component while Zahra and George (2002) believe that transformation must be part of assimilation. All the models agreed that interorganisational factors and prior knowledge are the main antecedents of absorptive capacity.

3.2.2 Influence Mechanisms

Traditionally, institutional theory has been used to describe how individual organizations face pressures to conform to shared behaviours and structures (Bharati et al. 2013). Institutional theory posits that an institution's environment can strongly influence the development of structures in the organization even more than its market pressures (DiMaggio and Powell 1983, Sherer et al. 2016). Organisations transform into similar structures due to pressures exerted by regulators, peers and the quest for legitimacy and further suggest three influence mechanisms of institutional isomorphism (DiMaggio and Powell 1983) These are coercive, mimetic and normative.

Table 3.2 Construct for Influence Mechanisms

Measure	Description	Literature
Coercive Pressure	Pressure from other organisations on which a focal organisation is dependent and pressure to conform to societal expectations	DiMaggio and Powell (1983); Sherer et al. (2016); Liang et al. (2007); Bala and Venkatesh (2007); Bharati, Zhang and Chaudhury (2013)
Mimetic Pressure	Pressure to imitate the actions of structurally equivalent successful organizations (peers or competitors) in the same industry	DiMaggio and Powell (1983), Sherer et al. (2016) Liang et al (2007) Bala and Venkatesh (2007); Bharati, Zhang and Chaudhury (2013)
Normative Pressure	Pressure to conform to industry norms developed through relationships and professional and business associations	DiMaggio and Powell (1983), Sherer et al. (2016) Liang et al. (2007) Bala and Venkatesh (2007); Bharati, Zhang and Chaudhury (2013)
Regulative Pressure	Rules, laws and structures that seek to regulate or constrain behaviour	Scott (2008)
Cultural cognitive	Involves people's shared beliefs I reference to what is generally taken for granted	Scott (2008)

Coercive pressure is driven by other organisations in the supply chain (with direct and/or indirect integrated lines) and pressures to conform to societal expectation (including regulatory bodies) (ibid). coercive, according to Gular et al (2002) could also arise from competitive necessity with the industry or market segment. *Mimetic* on the other hand is the pressure to uncertainty in which an organization mimics a successful counterpart in the environment, therefore, mimicry. According to Staw and Esptein (2000), mimetic pressure is associated to bandwagon effect. To support this assertion, Teo et al. (2003) in their study found that

organisations tend to imitate structurally similar organisations that are perceived to be successful. This is done to gain legitimacy in decision making in an uncertain condition where similar organisations in the same or similar domains have already done likewise worth imitating (Sherer et al, 2016). *Normative pressure* arises from professionalization that leads to members of a certain profession hold common norms, values and cognitive models. Scott (2008) redefines the isomorphism of institutional theory as regulative, normative and cultural cognitive elements.

3.2.3 E–Procurement Assimilation

The assimilation of IS application or innovation has longed been studied in IS literature. Fichman and Kemerer (1997) seek to explain the difference in propensity of organisations to initiate and sustain assimilation of complex technologies, specifically software process innovation adapting Gutman’s scale of assimilation using organizational learning and innovation diffusion theory. They theorized that organisations with higher learning-related scale, greater knowledge-related and greater diversity of knowledge and activities would be more prone to innovate and sustain assimilation. In their study, organizational learning and innovation diffusion theory was used as antecedents of IS assimilation and wanted to find out the extent to which these drivers would influence assimilation.

Table 3.3 Construct for E-Procurement Assimilation

Measure	Description	Literature
1. Awareness	Decision makers are aware of the information technology application in their operations	Fichman and Kemerer (1997) and Rai et al. (2009)
2. Interest	Organization is committed to actively learning more about information technology application in their operations	Fichman and Kemerer (1997) and Rai et al. (2009)
3. Evaluation/trial	Organization has acquired specific innovation-related product products and has initiated evaluation or trial	Fichman and Kemerer (1997) and Rai et al. (2009)
4. Commitment	Organization has committed to use a specific information technology application in their operations in a significant way	Fichman and Kemerer (1997) and Rai et al. (2009)
5. Limited deployment	The organization has established a program of regular but still limited use of information technology application	Fichman and Kemerer (1997) and Rai et al. (2009)

6. General deployment	The organization has reached a point where information technology application is substantially used	Fichman and Kemerer (1997) and Rai et al. (2009)
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In most IT assimilation literature, the concept has been modelled on 1) drivers (antecedents), 2) components and 3) outcomes. On the issue of assimilation components, Fichman and Kemerer (1997) modelled IT assimilation based on Gutmans' scale as *awareness*, *interest*, *evaluation/trial*, *commitment*, *limited deployment* and *general deployment*. The works of Vaidya et al. (2005) and Rai et al. (2009) adapted the same scale as components of assimilation. However, Liang et al. (2007) argue a different view of what constitute IT assimilation, they believe that the extent of IT application and innovation should be modelled on *volume* (percentage of business transactions using IT tools), *diversity* (the number of functional areas of business transaction automated) and *depth* (the vertical impact of IT on business activities).

3.2.4 Value for Money

Value for money is most important principle of procurement especially in the public sector, which entails consideration of the contribution to be made to advancing government policies and achieving the best returns and performance for the money being spent (Bauld and McGuinness 2006 and Raymond 2008). Achieving Value for money in most jurisdiction is a statutory requirement, which involves the aggregation of quality, price, technical merit, aesthetics and functional characteristics (Akbiyikli and Eaton 2005). Theoretically, the goal-setting theory has been mentioned in a few occasions in value for money literature. The goal-setting theory believes that the performance objective of procurement is to identify the expectations of stakeholders. The goal of public procurement is to obtain an optimal combination of high quality and low prices (Bergman and Lundberg 2013). According to Locke and Latham (1990), the goal-setting theory establishes stakeholders' satisfaction by gauging the disparity between the *ex-ante* goals and the *ex-post* performance

The concept of Value for money especially in procurement has not been empirically tested or studied to a larger extent but has its foundation deeply rooted in literature and this study draws inspiration from extant literature of Value for money in procurement from a number of studies, from individual authors, research bodies or organisations. To begin with, Butt and Palmer (1985) argue that Value for money is built on economy, efficiency and effectiveness. This view was supported by Ruther and Potter (2003) and Akbiyikli and Eaton (2005). Nsiah-Asare and

Prempeh (2016) define Value for money to consist of economic gain and efficiency in addition to other criteria such as accountability, fairness and transparency, ethics and competitiveness. The World Bank (2003) also gave a different view of how Value for money should be defined. According the World Bank, Value for money is the optimum condonation of whole-life cost and quality. This view is supported by SPFM (2004), and CIPS Glossary (n.d). Morillos and Amekudzi (2008) supported this assertion but put it in a different context, suggesting that Value for money involves two components: the qualitative and quantitative assessment. They explained quantitative to mean those dimensions that can be measured, that is cost, and regard the qualitative aspect to mean quality. The United Nations Organisation for Peace Building, Humanitarian and Development Operations (UNOPS, 2010) sets Value for money as the trade-off between price (cost) and the performance (quality) that provides greatest overall benefits to the procuring organization. They all believe that the supplier/vendor selection process should consider price and quality.

In addition to economy, efficiency and effectiveness and cost-quality approaches, a third emerging dimension featured in recent Value for money literature in the rule-based approach that really limits the advantage and discretion of public officials (Raiser, 2014). These dimensions manifest themselves as competition, fairness and transparency, accountability and ethical consideration (Barnet 2010 and Manu 2005).

Drawing inspiration from the above literature on Value for money, this study conveniently categorized the dimensions of Value for money in public procurement into two distinct classes; namely, *economic dimension* and *rule-based dimension*. To begin with, the economic characteristic, according to Rutter and Potter (2003) reflects the quality and cost resources obtained through the procurement process at the stages throughout the useful life of an asset. It measures what goes into providing a service or good(s) which constitute the whole-life cost manifested as direct and indirect cost of acquiring, running and disposing of what is procured. Therefore, the economic dimension reflects quality-cost balance (World Bank 2003; CPFM 2004; CIPS n.d.; Morillos and Amekudzi 2008; UNOPS 2010 and Dimitri 2013; Bergman and Lundberg 2013). Quality as defined by Juran (1989) is meeting customer's needs and freedom from deficiencies. ISO (2005) says quality is the degree to which a set of inherent characteristics fulfils requirements. These attributes of quality are not different from CPFM (2004) concept that is fitting the purpose and meeting user's requirements. As stated earlier,

the cost component is not only reflected in the price but also total cost of ownership, operating and disposal costs.

Efficiency and effectiveness of the procurement function, which have also been mentioned as measures to determine value for money either reflect as quality, cost or both. Rutter and Potter (2003) state that efficiency reflects the management of the delivery and operation of an asset through its useful life. The idea of efficiency is to minimize resources used in the procurement function and still yielding the same or a better outcome. As Kestenbaum and Straight (1998) put it, efficiency measures the unit cost of output required, work measurement (labour input) and cycle time of project execution. It further explains the extent to which procurement requirements are delivered and achieved on time to avoid budget overruns. This is so because the longer it takes a project or procurement activity to be delivered, the higher the cost and the inefficient it becomes.

Table 3.4 Construct for Value for Money Construct

Category	Measure	Description	Literature
Economic Dimension	Cost	Whole-life cycle cost of acquisition	World Bank, 2003; CPFM, 2004
	Quality	Meeting requirements Fitness for purpose Less variance	World Bank (2003) CPFM, 2004, Juran (1989), ISO (2005)
	Efficiency	Minimizing resources used in the procurement function and still yielding the same or a better outcome by controlling the unit cost of output required, work measurement (labour input) and cycle time of project execution cost, staffing, productivity and cycle time	Rutter and potter 2003; Kestenbaum and Straight, 1998; CIPSA, 2005; Barnet et al, 2010
	Effectiveness	Extent to which outputs achieve the desired outcomes, customer satisfaction, the level of performance achieved throughout the useful life of an asset to ensuring the consistency between the intended results and the actual results	Batho Pele Handbook (2007), DeToro and McCabe (1997) Backlund and Chroner (2014), Rutter and Potter (2003), Akbiyikli and Eaton (2005)
	Competitiveness	Broadening the scope of tendering to as many potential suppliers as possible	Raiser (2014), Raymond (2008), Public Procurement Manual 2003)

Rule-Based Approach	Transparency and fairness	The same rule applying irrespective of diversity and openness	Raiser (2014), Public Procurement Manual 2003)
	Accountability	Responsible and accountable for procurement decisions	Raiser (2014), Public Procurement Manual 2003)
	Professionalism	The extent to which education and experience are applied in making decision regarding the procurement function	Raiser (2014), Public Procurement Manual 2003) Raymond (2008)
	Ethical and environmental issues	Adherence to standards and codes regarding tendering, labour, the environment, etc.	Public Procurement Manual 2003) Raymond (2008) Atkinson (2003)

CIPSA (2005) believes that any measure of procurement efficiency should consider the cost, staffing, productivity and cycle time. Simply put, efficiency of procurement process or operation is the measure of productivity that is how much you get out of what is put in (Barnet et al, 2010). Therefore, this study proposes that efficiency of the procurement function is a measure of cost. Rose (2005) tried to show the relationship between efficiency and quality of a project and stated that efficiency is quality as perceived by the buyer. But for an institutional buying context like the public sector, the requirement of the user is in most cases translates into the order by the buyer. Therefore, it is difficult to separate the requirements of the user from that of the purchaser.

Effectiveness, according to Batho Pele Handbook (2007) is the extent to which outputs achieve the desired outcomes and also a customer satisfaction measure in the sense that the outcome of every procurement activity is to satisfy or exceed all the requirements of the customer (DeToro and McCabe 1997). This presupposes that the demand of the end-user of every procurement activity cannot be overlooked. Related to the above descriptions of effectiveness are the works of Rutter and Potter (2003) and Akbiyikli and Eaton (2005). The former describes effectiveness to reflect the level of performance achieved throughout the useful life of an asset and the latter, ensuring the consistency between the intended results and the actual results. According to Rose (2005), effectiveness is the quality as perceived by the user and this study also proposes that effectiveness of the procurement function is a measure of quality from the user's perspective reflected in the performance and meeting the user's requirements.

Finally, the rule-based approach as captioned by Raiser (2014) seeks to limit the discretionary powers of public officials through the observation of certain principles that guide the conduct of procurement right from the onset. These are competitiveness, transparency and fairness, accountability, ethical standards and professionalism (Manu 2005; Raymond 2008; Nsiah-Asare and Prempeh 2016; Raiser 2014). These rules ensure that goods and services are obtained at the most economic process and thus reduce cost.

3.3 Theoretical Model and Hypotheses

Drawing on the institutional absorptive capacity and institutional theories, this study posits that the two theories will have significant influence on E-procurement assimilation, stages of the procurement process and value for money in public sector procurement.



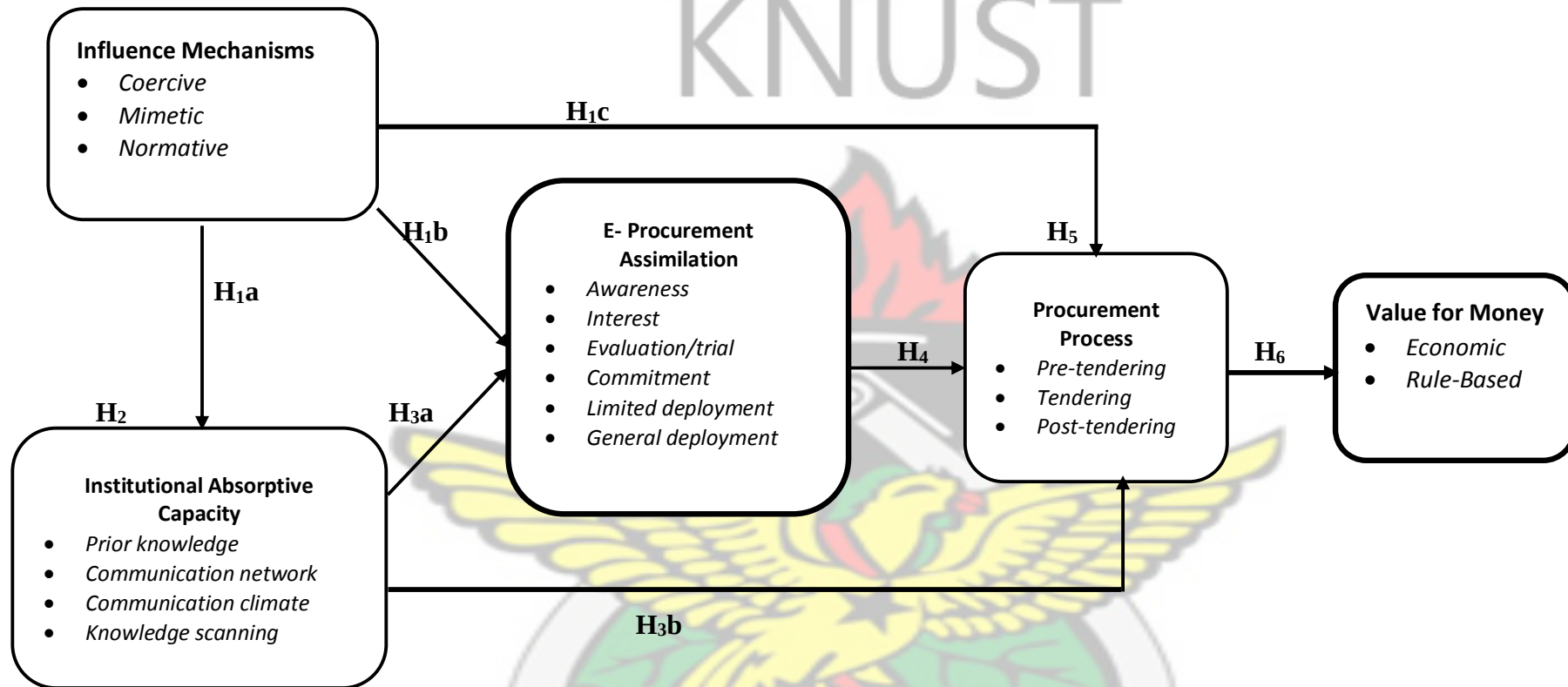


Figure 3.1 Research model

3.3.1 Influence Mechanisms and Absorptive Capacity

Institutional theory and absorptive capacity have been over the years studied separately in IS research as antecedents of either IS adoption, usage and assimilation. But a few studies, for the past few years have tried to establish the relationship between the two in IS research. From corporate governance research, Shubham et al. (2018) studied the relationship between institutional pressure and implementation of corporate environment practices and concluded that the relationship between institutional pressure and implementation of corporate environment practices is mediated by an organisation's absorptive capacity. Similarly, Bharati et al. (2013) found institutional theory to be an antecedent of absorptive capacity in IS research, meaning institutional pressure has a direct impact on an organisation's absorptive capacity in both previous experience and the ability to learn and exploit new knowledge. Earlier, Bharati and Chaudhury (2011) did a similar study and conclude that absorptive capacity mediates the relationship between institutional theory and assimilation of web 2.0 technologies. This study proposes therefore that:

H_{1a}: There is a significant positive effect of institutional influence mechanisms on an organisation's absorptive capacity in public sector procurement.

H₂: Institution's absorptive capacity mediates the relationship between influence mechanisms and the tendering process.

The drivers or antecedents of IT assimilation differ from one author to the other depending on the theory being used. Rai et al (2006), based on RBV and absorptive capacity, named top management support, IT sophistication and system infrastructure as drivers of assimilation but later reconceptualized to include organizational readiness (Rai, Brown and Tang 2009). Fichman and Kemerer (1997), using organizational learning and innovation diffusion theory, have related- scale, related knowledge and diversity of knowledge as the antecedents of assimilation. In addition, Armstrong and Sambamurthy (1999) modelled the drivers of IT assimilation based on RBV as senior leadership knowledge and system of knowing. And lastly Vaidya et al. (2005) also based on RBV conceptualized the antecedents of IT assimilation as organizational readiness and supplier readiness. Another theory that has also gained popularity in IS literature in terms of use is institutional theory in the design, use and consequences of technologies (Krell et al. 2006). Of late, institutional theory has offered a rich source of information not only in IS adoption but also in assimilation across markets and organisations.

With specific reference to IS adoption, a recent study by Sherer et al. (2016) found all the three institutional isomorphisms to have various degrees of influence electronic health records adoption in the US. Liang et al. (2007) developed and tested a theoretical model to investigate the effect of institutional pressure on the assimilation of enterprise systems in the post-implementation stage within an organization and found a direct effect of mimetic and normative pressures on assimilation. Bala and Venkatesh (2007) also studied how institutional force (coercive, mimetic and normative) influence the assimilation of interorganisational business process standards and concluded that the three institutional isomorphisms have significant impact on interorganisational business process standards assimilation. It is interesting to note that studies done by Sherer et al. (2016) was conducted in the health sector only in the US while Liang et al (2007) and Bala and Venkatesh (2007), which form the foundation of current study on institutional pressures and e-procurement assimilation, were private sector focus and in the advanced economies. Given the strength of institutional forces as antecedents of IS assimilation and little is known in public sector procurement, especially, in sub-Saharan Africa. The current study sees this as a gap and hypothesizes that:

H_{1b}: influence mechanisms have positive effect on e-procurement assimilation in the public sector.

3.3.2 Influence mechanisms and procurement process

Though institutional theory has been extensively used in IS literature, not much is known of its application in the public procurement discourse. A study by Flynn and Davis (2014) shows that out of 50 articles published by journal of public procurement between 2001 and 2013, which contained identifiable theories, only two used institutional theory. The first is Akenroye (2013) who attempted to explain social criteria in supplier selection decision in terms of institutional forces bearing organisations.

The second is Dickens-Johnson (2008), who also applied institutional theory to understand public outsourcing trends. As stated earlier, the practice of procurement in the public sector is highly institutionalized in terms of regulations through procurement laws, procedures and guidelines. This coupled with interest and oversight control of notable multinational bodies in public service, create strong institutional forces that influence the public procurement process. This is evidenced in the fact that public procurement is bureaucratic and legalistic, with its success depending on organisations adhering to its laid down regulations, processes and

structures (Flynn and Davis, 2014). The deficiency of the two earlier-mentioned studies is that institutional theory was not applied to the entirety of the procurement process but just aspects of it. For instance, while Akenroye (2013) was interested in the application of institutional theory in supplier selection decision, Dickens-Johnson (2008) focused on its application in public outsourcing trends. The current study focuses on applying influence mechanisms (institutional theory) holistically on public procurement process from pre-tendering through to post-tendering stages and hypothesizes that:

H_{1c}: Influence mechanisms have positive significant effect on the public procurement process.

3.3.3 Institutional absorptive capacity and E-procurement Assimilation

The relationships among absorptive capacity's antecedents, components and outcomes are interlaced with mediators and moderators called contingent factors (Addorisio et al. 2014). Previous studies proposed several contingent factors of absorptive capacity, but there appears to be a consensus that regime of operability is the predominant contingent factor. (Cohen and Levinthal 1990; Zahra and George 2002; Todorovan and Durisin 2007 and Volberda et al. 2010). Interestingly, while Cohen and Levinthal (1990) view regime of operability as mediating the relationship between absorptive capacity's antecedents and components, Zahra and George (2002) see it as mediating the relationship between absorptive capacity's components and outcomes. The predominant outcome of absorptive capacity is organizational performance (Zahra and George 2002; Lane et al. 2006; Todorovan and Durisin 2007 and Volberda Foss and Lyles 2010), innovation (Cohen and Levinthal 1990; Zahra and George 2002; Todorovan and Durisin 2007 and Volberda et al. 2010) and competitive advantage (Zahra and George 2002; Todorovan and Durisin 2007 and Volberda Foss and Lyles 2010).

The significance of absorptive capacity on IT assimilation has featured prominently in information systems literature. According to Addorisio et al. (2014), organisations are dedicating more of their resources (e.g. expenditure services, software, infrastructure and human resource enhancement) towards the developing and building of absorptive capacities which help them use their acquired knowledge to take advantage of innovation for marketplace competition. Therefore, absorptive capacity has become important in IS innovation and assimilation. This is evidenced from absorptive capacity research which state that one of the main outcomes of absorptive capacity is innovation (Cohen and Levinthal 1990; Zahra and George, 2002; Todorovan and Durisin 2007 and Volberda et al. 2010). A study by Limaj and

Bernroider (2017) suggests that the absorptive capacity of an organization has positive effect on innovation. Technology innovation, according to Ince et al. (2016), makes it possible for organisations to respond to changes and acquire technological strategies and innovative outputs. Ince et al. (2016) further state that absorptive capacity enables an organisation to obtain information, allows it to make external information useful and develop new capabilities. Teo et al. (2003) posit that an aggressive technology policy allows organisations to expand and enhance their knowledge base to process new technology assimilation. In their study, Wei et al. (2015) investigated the antecedents of RFID assimilation and hypothesized that a company with high absorptive capacity can go further along in the assimilation process than others, and also are well placed to assimilate complex IT applications.

With reference to absorptive capacity on e-procurement, not much has been researched on. Rai et al (2006, 2009) believe that the level of IT sophistication and e-procurement innovation infrastructure influence e-procurement innovation assimilation. The study of Vaidya et al. (2005) which was to determine the antecedents of e-procurement assimilation concluded that an organisation's readiness in terms e-business capabilities positively impacts the transactional and strategic assimilation of e-procurement. It is worth mention that Rai et al (2006, 2009) and Vaidya et al. (2005) conducted their research in industries other than the public sector. Vaidya et al. (2005) admonish that their study would have served a better purpose if it was done with public sector procurement. This current study therefore, hypothesizes that:

H_{3a}: An organisation's absorptive capacity has positive influence on its e-procurement assimilation

According to Hawkins and Muir (2014), experience accumulation and knowledge articulation are essential in developing capability with an organization. Baldwin and Evenett (2009) stated that Federal agencies in the USA should hire contractors who have adequate knowledge, competence and experience in contract management. By extension, the actors in the procurement process ought to have the same or better levels of knowledge, competence and experience to execute the procurement agenda in their respective organisations. They believe that, with this, the contracting authority could achieve the acquisition goals and performance. The tasks needed to be performed in the procurement process are sometimes regarded as tendering competency (McKevitt et al. 2012). This is so because practitioners of public procurement need to build task competence to perform the tendering process satisfactorily. These competencies, experiences and knowledge sharing form the institution's absorptive

capacity so far as procurement is concerned, and the more these competencies are developed by actors in public procurement, the better the performance of the tendering process. On these bases, this study proposes that:

H_{3b}: An institution's absorptive capacity has a positive influence on the tendering process

3.3.4 E- Procurement Assimilation and Procurement Process

According to Armstrong and Sambamurthy (1999), IT assimilation is regarded as an important outcome in the effort of organisations to leverage the potential of information technology in their business activities and strategies. With specific reference to procurement, the outcomes could be manifested in areas such as 1) productivity, 2) efficiency gains, 3) goals achievement, 4) effectiveness, and 5) performance. But this is an area where most of the literature on E-procurement assimilation has not captured. This could be due to literature focusing more on assimilation as dependent variable. Just a few studies have really studied the effect of E-procurement as an independent variable on procurement productivity (Rai et al. 2006; Rai et al., 2009) and relationship development and efficiency gains (Wu et al. 2007). E-procurement initiatives in the public sector should be an effort to modernize public procurement and to improve public procurement goals (Vaidya et al. 2005), and by extension, value for money. Similarly, Rai et al. (2006) posit that e-procurement in many organisations improves the efficiency and effectiveness of procurement through increase in usage patterns whiles Boer et al. (2002), Croom and Brandon-Jones (2007) and recently Kauppi et al. (2013) have established the relationship between e-procurement and performance.

Context-specifically, the outcome of procurement activities in Ghana's public procurement as stated in Act 663 is the achievement of value for money. But it can be deduced from the above that e-procurement assimilation will have significant influence on value for money only when it improves the efficiency of the procurement process. The procurement process typically involves a large amount of information processing and communication (Gebauer et al. 1998). At the pre-tendering and tendering stages, information exchange between the contracting organization and the tenderers must be enough to encourage participation, competition and decision making. An equal measure of information exchange is expected at the post-tendering stage between the contracting organization and the supplier or contractor to aid execution and performance. Therefore, in the context of public procurement system, organisations need to build information processing capacity in order to meet the requirements of the procurement

information processing. Any difference between the two creates a gap, which is conceptualised by *Information Processing Theory* (Tushman and Nadler 1978 and Haubmann et al. 2012). One of such capacities public organisations can build to achieve information processing requirements is IT application. Gebauer et al. (1998) argue that emerging technologies (such as e-procurement tools) are reversing the tradition of costly, time-consuming and inefficient procurement processes. Therefore, the extent of IT infusion in public procurement process will have significant impact on the procurement process requirements, which eventually makes the procurement process efficient. In the light of the above regarding e-procurement assimilation in public sector procurement, the study hypothesizes that

H4: E-procurement assimilation in public sector procurement has a significant effect on the procurement process.

H5: E-procurement assimilation in public sector procurement has a significant effect on value for money only when it leads to efficient procurement process (mediating role)

3.3.5 Procurement Process and Value for Money

The procurement function is not just an activity but consists of series of related and sequential activities that are carried out irrespective of what is being procured, be it goods, services or works, either of low or high value and whether for direct and indirect use. These activities include design and planning, sourcing, negotiation and contracting (Dimitri 2013). The rest are contract management, monitoring and evaluation. These activities are grouped into three stages: pre-tendering stage, tendering stage and post-tendering stage (OECD 2009). For example, activities in the *pre-tendering stage* in the procurement process include needs assessment, procurement planning, defining requirement and choosing the best method. The *tendering stage* on the other hand involves invitation to tender, evaluation and negotiation while the *post-tendering* involves order placement, contract management, and payment. In each of these stages are inherent practices and behaviour which are likely to affect the achievement of value for money (Dimitri 2013). As Arlbjorn and Freytag (2012) put it, “the dominant logic in public sector has it that tendering creates more value” but there no empirically research which seeks to test the extent to which the procurement process through its various stages, influences value for money. This study sees this as a gap and hypothesizes that:

H₆: The procurement process has significant influence on procurement value for money outcome in the public sector.

3.3.6 Control Variable – Industry Effect

The World Bank (2002) admonishes that when formulating public policy, it is imperative to emphasize on ‘good fit rather than ‘one-size-fits-all’. Policy formulation in the public sector must consider differences in industry characteristics and ought to be organization specific (Owusu 2006). This is because there exist differences in public organisations – even those in the same industry (ibid). According to Zucker et al. (1987), not all organisations are equally institutionalized, therefore, the way and manner they build capacity over time and the sort of institutional forces they are confronted with may differ from one industry to another. This study proposes that the structural differences difference among public sector organization could lead to differences in outcomes so far as the research focus is concerned. On that bases, this study controls for industry effect in the research model.

3.4 Chapter Summary

In this chapter, the theoretical framework of the antecedents and outcomes of electronic procurement as well as the tendering process is presented. It first critically reviewed the antecedents of information systems assimilation and later narrowed down to electronic procurement assimilation. The focus was on institutional pressures and absorptive capacity and how they influence assimilation and the tendering process. Next, the chapter reviewed the relationships among electronic procurement assimilation, tendering process and value for money. Lastly, hypotheses were formulated to test the relationships among the constructs. To test the hypotheses to achieve the objectives of the study, the kind of research approach and the methodology adopted are very crucial. These are discussed in chapter four.

CHAPTER FOUR

APPROACH AND METHODOLOGY

4.1 Introduction

This chapter entails a description of the methodology employed, research philosophy and approach adopted. It also discusses the data collection method used in gathering the data and how analysis of data needed to achieve the research objectives is conducted. Bhattacharjee et al. (2012) opined that research methodology indicates how the researcher has planned to gather all the necessary data that is needed to arrive at the problems on grounds. Specifically, this chapter covers the research design, philosophy and approach, data collection tools and data analysis. It also extensively describes the procedure adopted to develop the instrument for value for money for this study

4.2 Research Design

Research design is the general plan of how a researcher goes about answering the research questions (Saunders et al. 2015). The design of a research bothers on making choices of several methodological alternatives on the appropriate philosophy, purpose, strategies and approach, which informs the type of data to be collected, from whom and how the data ought to be analysed in a scientific manner. According to Brewerton and Millward (2001), there are three basic categories of research design; *case study*, *correlational* and *experimental designs*. Case study is an empirical research that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clear (Yin, 2003). Case study has the capacity to generate insights from intensive and in-depth research into its real-life context (Saunders et al. 2015). One of the critical tasks of designing a case study research is the choice of the boundary (Flyvberg 2011). A case study, according to Yin (2014) cited in Saunders et al, (2015) which has widely been used in exploratory and descriptive research can also be used for explanatory purposes. It is therefore possible that a case study can accommodate different research approaches. Yin (2003) says it can accommodate both qualitative and quantitative data, but it is widely used in qualitative research (Lodico et al. 2006). A case study strategy may be preferred to other strategies if it satisfies the criteria for selection, is appropriate to investigate and compatible with philosophical viewpoint (Wedawatta et al. 2011).

Correlation research strategy is a quantitative design that shows the relationship between 2 or more variables (Lodico et al. 2006). The variables are tested in correlation study, show the extent to which they relate to each other. Simple correlation is not intended to show causality and it is more non-experimental, as in descriptive research. As Brewerton and Millward (2001) put it, the intention of correlation study is generally not to infer causes but to examine the relationships and interrelationships between phenomena.

Experimental research design, on the other hand, involves the manipulation of one variable and observing its effect on another (Brewerton and Millward 2001). According to Lodico et al. (2006), researchers believe that experimental design is the only type of research that can result in findings that show causal relationships involving controlling for external variables as much as possible. Experimental research involves two critical variables; response variable and explanatory variable. The response variable is the outcome measure, also called the dependent variable and the explanatory variable called independent variable predicts the behaviour of the response variable. This study adopted the experimental research design as it seeks to establish the effect of an assimilated e-procurement process (the explanatory variable) on value for money creation (the response variable) in the public sector in the developing economies, controlled by industry effect and the stages in the procurement process. Another way to look at it is that the study tries to show the causal relationships among influence mechanism, absorptive capacity and e-procurement assimilation.

4.2 Scientific Research Reasoning

There are two basic types of reasoning when it comes to research. These are *inductive reasoning* and *deductive reasoning*. In inductive reasoning there is a gap in the logic argument between the conclusion and the premises observed, with the conclusion being 'judged' to be supported by the observations made (Ketokivi and Mantere 2010). Inductive reasoning uses observations to build an abstraction or to describe a picture of a phenomenon being studied (Lodico et al. 2006). Inductive reasoning leads to inductive data collection when the researcher systematically observes, searches for patterns and develops a generalization. Inductive reasoning, according to Williamson (2002), is also associated with the hypothesis generating approach which initially begins with fieldwork and observations and later hypotheses are generated from the analysis of collected data.

In contrast, deductive reasoning uses a top-down approach where researchers first make a statement and then seek specific evidence that would support or disconfirm that statement (Lodico et al. 2006). Therefore, deductive reasoning is linked with hypothesis testing approach where the argument moves from hypothesis generation (Williamson 2002). The current study adopted deductive approach for several reasons. First, the study is theory driven (Saunders et al. 2015) and for that matter involves the testing of several hypotheses based on the assumptions of the theories being used. Secondly, because of the theoretical position of this study, a theoretical framework is constructed which aided data collection and analysis.

4.3 Research Philosophy and Approach

Research philosophy is very important in any kind of research whether natural sciences or social sciences. If a researcher fails to think on philosophical issues in their research it can seriously affect the quality of research (Easterby-Smith et al. 2002). As Bahari (2010) puts it, prior to the conduct of a research, one must think of the underlying philosophy, as philosophy is central to every research design. In the social sciences, it relates to the development of knowledge and the nature of that knowledge in the social world. The philosophical origin of phenomenon can be traced to ancient allegory of ideas that what people understand to be reality is only a shadow of what the phenomena of the true reality is (Tarnas 1991). This is so because, reality and phenomena of the reality are distinctly separate. Therefore, a research approach of the philosophical assumptions must be clear and the research methodology must follow these assumptions, which are ontology and epistemology (Converse, 2012).

Ontology refers to the assumption about the nature of reality which shapes the way one sees and studies the research objects. The position of ontological assumption is that reality has existence independent of the knower (Cohen et al. 2007). This indicates that a researcher's position of objects is different from the reality.

The central point of ontology is the question of whether social entities can and should be considered objective entities external to reality or whether they can and should be based on social construction built from perception and actors of social actors (Bryman, 2012). According to Saunders et al. (2015), Ontology concerns researchers' assumptions about the nature of the world and reality they make and determine what research objects and phenomena you focus on, and how they see and approach them. Ontology is also about the nature of world and what

it consists of, what entities operate within it and how they interrelate to each other (Staiton-Rogers 2006). Reality is subjective and different people have multiple perceptions and belief about the social reality and therefore, ontological assumptions are thought of as subjective-objective realism (Morgan and Smircich 1980 and Bahari 2010)

Epistemology concerns assumptions about knowledge, what constitutes acceptable, valid and legitimate knowledge, and how it can communicate knowledge to others (Burrell and Morgan 1979, cited in Saunders et al. 2015). The central point of epistemology is the question of whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences (Bryman, 2012). Epistemological assumptions are concerned with how knowledge can be created, acquired and communicated, in other words, what it means to know (Scotland, 2012). When it comes to epistemology, there are several key questions. One is whether you subscribe to the philosophical principles of rationalism or empiricism. Another is whether you buy the assumptions of the scientific method, often called positivism in the social sciences, or favour the competing method, often called humanism or interpretivism (Russell 2006).

Rationalism is the idea that human beings attain knowledge because of their capacity to reason. From the rationalist perspective, there are a priori truths, which, if we just prepare our minds adequately, will become evident to us (Russell 2006). The rationalists believe that there is a clear distinction between prior knowledge and knower and a person through deductive reasoning alone can gain rational knowledge because rationalists believe that reason is the essential route to truth, which exists in the world of ideas.

The *empiricists* on the other hand argue that only experience can reveal true knowledge. They believe that truth is not ready made and must be revealed through empirical methods. “What we come to know is the result of our experience written on that slate... We see and hear and taste things, and, as we accumulate experience, we make generalizations... and we come to understand what is true from what we are exposed to” (Russell 2006, p 4).

Research in social sciences is guided by two traditions – the *positivism* and *interpretivism*. Positivism is attempting to apply research methods in the natural science to a social science context while interpretivism emphasizes the meanings made by people as they interpret their

world. Positivism relates to the philosophical stance of the natural science and entails working with an observable social reality to produce a law-like generalization (Saunders et al, 2015). Its motive is to promote unambiguous and accurate knowledge, and they consider that it can only be based on what can be objectively observed and experienced (Dick 1991). A positivist sees organisations and social entities as real in the same way as physical objects. Interpretivism on the other hand believes that social world is interpreted and constructed by people and is therefore different from the natural world (Williamson 2002). Unlike positivists, interpretivists hold the position that social science research needs to be different from the natural science research rather than trying to emulate it (Saunders et al 2015). To the interpretivists, different people from different cultural settings, under different circumstances at different times, make different meanings and create different social realities.

This study, for its deductive stance, adopted the positivist posture. This is because positivist research is based mainly on deductive style of reasoning (Williamson, 2002). The study has defined variables and predicts their relationships through framing of hypotheses. The hypotheses are then tested through experimental design. This is done to either support or corroborate or to disconfirm the theories (Popper 1959)

There are two main research methodologies: *qualitative* and *quantitative* and of late a combination of the two in what is called the mixed method, is gaining acceptance as a way of improving substantive research findings (Gunnell 2016). According to Lodico et al. (2006), qualitative research involves the collection of data using primarily narrative or verbal methods through observations, interviews and document analysis. It only formulates hypotheses after data collection and analysis. It is often associated with interpretive philosophy and inductive reasoning (Saunders et al. 2015). Quantitative is often used as a synonym for any data collection and analysis technique that generates numerical data (ibid). Brewerton and Millward (2011) posit that quantitative research prescribes a method of enquiry which presupposes complete control over variables and their effects on or interaction with other variables to identify a quantifiable cause-effect relationship.

Mixed method involves combining or integrating qualitative and quantitative methods in a single study (Creswell, 2014 and Saunders et al. 2015). The philosophical underpinning of this method is based on the fact that there is external reality and each person understands and

interprets from a social conditioning. In this regard researchers may use quantitative analysis of officially published data followed by qualitative method to explore perception (Saunders et al. 2015).

This study is quantitative because it is based on methodological stance of positivism (Adam et al. 2007; Saunders et al. 2015 and Creswell 2014). The principle of positivism emphasizes the collection of quantitative data, that is data in the form of numbers (Williamson 2002). It is also quantitative because of its hypothetic-deductive characteristics (Lodico et al. 2006). The hypotheses, created before data collection, are based on theories which are tested to support or disconfirm these theories to enable generalization.

4.4. Data collection Procedure

4.4.1 Population

Almost every research requires respondents to provide some form of information relating to the subject matter under study (Brewerton and Millward 2011). These respondents form the population of the research. Saunders et al. (2015) define population as the full set of cases or elements from which a sample is taken. The population is therefore the largest group a research would like the outcome of the research to be generalized to (Lodico et al. 2006). When the population is aggregated, it is expected that they share at least one common characteristic which could be, for example sex, age, marital status, or geographical groupings. Because the level of analysis of this study comprises all public sector organizations which are mandated to use Public Procurement Act (Act 663) and the objective of not limiting to the frame to a few organisations, senior managers in the public sector and entity tender committee members form the population of this study. These individuals are more familiar with ideas and values within their respective organisations and have adequate knowledge of the public procurement process and therefore are in the best position to respond to the questionnaire (Hambrick and Mason 1984; Limaj and Bernroider 2017). Part II of the Public Procurement Act 2003 (Act 663) states the entities the law applies to. These are central management agencies, MMDAs, sub-vented institutions such as schools, hospitals, and universities. The rest are state –owned enterprises, the Bank of Ghana, state owned banks, statutory bodies and commissions, and welfare institutions established by law. As almost all these organisations fall under a ministry or department, the study further classifies them into key sectors. These are education, health, agriculture, energy, local government, science, environment and technology, lands and

forestry, state-owned enterprises, works and housing and security. With respect to respondent population, the study targets heads of entity, directors and deputy directors, procurement directors and deputies, engineers, architects, accountants and finance officers, heads of stores, heads of user departments and heads of operations. The selection of these individuals are based on three key factors – 1) they are senior managers of the entities and they represent the face of the organisations, 2) they have adequate knowledge in the procurement process and 3) most of them are members of the Entity Tender Committee and Tender Review Boards of the respective organisations and ministries.

4.4.2 Sampling

After identifying the research population for this study, the next stage was to select the sample. Sample, according to Lodico et al. 2006) is a small group selected from the population that is representative of the population. It allows working with a smaller, a more manageable subgroup of the population. Sampling does not only purport to achieve population representation but also to pursue theoretical line of enquiry (Saunders et al. 2015). According to Adams et al. (2007), sampling refers to the process or technique for selecting appropriate sample for determining parameters and characteristics of a whole population. Two basic types of sampling techniques are identified: probability and non-probability sampling. With probability sampling chance of members of the population being selected is known and all cases in the population have equal chance of being selected, while the chance of each member in a non-probability sampling is unknown (Saunders et al. 2015). However, the choice of sampling technique is dependent on the type of research strategy adopted. This is because the validity, reliability and the generalizability of the study are influenced by the quality of data gathered and the techniques used to gather them (Adams et al. 2007). As non-probability sampling techniques are designed for qualitative research, probability sampling goes well for quantitative research (Saunders et al, 2015; Adams et al. 2001; Lodico et al. 2006; Brewerton and Millward 2011). This study adopted the probability sampling technique. There are different types of probability sampling approaches. These are simple random sampling, stratified random sampling, systematic random sampling, cluster sampling, multiphase and multistage sampling techniques.

Simple random sampling enumerates all individuals in the study population in ascending or descending order. It involves complete random selection of members of a population which requires a sampling frame. Similar to simple random is systematic sampling which select a

suitable sampling fraction from the population and selecting every n th sample case. Stratified sampling, on the other hand, divides the population into 2 or more subgroups or strata based on certain attributes and a random sample is drawn from each of the strata. Cluster sampling signifies the selection of clusters of the population instead of individual cases (Kultar 2007). Multistage sampling involves the selection of cases at more than one stage.

This study uses multistage cluster sampling and convenience sampling technique. The sampling frame consists of all public entities which are by law expected to use the Act 663 for their procurement activities. There are about 1538 entities on public procurement authority's list. These entities are clustered under their appropriate ministry, department and agency. Another factor used to cluster the population was based on similarity in industry characteristics. Based on the large number of public entities and the common attributes some of the have, the entities were further categorized into four (4) distinct clusters – *Classical, local government, project-based* and *state-owned enterprises*. Classical sector cluster represents public organisation which render not-for profit services, including education, health, judiciary, security services and agriculture, the project-based refers to roads, railways, works and housing, communication and technology organisations, science and environment. These are high spent entities. The local government cluster refers to regional, metropolitan, municipal and district coordinating authorities while state-own enterprises cluster is composed of for-profit public organisations, including VALCO, state banks, bank of Ghana, metro Mass Transit, national lotteries, etc. A total of 370 entities were selected comprising of 120 classical, 120 local government (MMDAs), 80 project-based organisations and 50 state-owned enterprises as indicated in table 4.1. The convenience sampling was used to for data collection since all the Entity Tender Committee members and Tender Review Board members qualified to respond to the questionnaire, available members were issued with the questionnaire. To ensure good results are obtained from the PLS-SEM analysis of the research model, it is necessary to ensure that an adequate number of responses have been obtained. A popular guideline indicates that the minimum sample size for a PLS model should be equal to the larger of the following: (i) ten times the largest number of formative indicators used to measure one construct; or (ii) ten times the largest number of inner model paths directed at a particular construct in the inner model (Barclay et al. 1995). There was one formatively measured construct (E-procurement Assimilation) which had 9 indicators, meaning 90 samples would be sufficient to meet the first criterion. The constructs with the highest number of incoming paths were Institutional Absorptive Capacities, Influence Mechanisms and E-procurement Assimilation, with two

incoming paths each, meaning a sample of 20 would be sufficient based on the second criterion. The larger of the two was 90 meaning that a sample of 90 would be sufficient. This criterion is however considered an over simplistic estimation of minimum sample size, as it fails to consider important factors such as effect size, reliability, and number of indicators, all of which can affect power (Henseler et al. 2009). To provide a more rigorous test for adequacy of the sample size, an a priori power analysis was conducted. Given a recommended alpha of 0.05, and a medium effect size of 0.3, the power test revealed that a minimum sample size of 134 would be required to achieve a power of 0.95. Hence the sample size of 306 used in this study was sufficient to achieve valid results.

Table 4.1 Sample Distribution

Entity Type	Sample selected	Usable
Classical	120	87
Local Government	120	113
Project-based	80	60
State-Owned Enterprises	50	46
Total	370	306

About 70% of the population was sampled from Greater Accra region, where the seat of government is located and where all the ministries are situated as well as the head offices of most of the state-owned enterprises and other public agencies. All the 306 questionnaires retrieved were usable, though there were a few individual missing items, they were insignificant to render a whole questionnaire invalid.

4.4.3 Operationalisation of the Constructs

The study developed the instrument for measurement of constructs through review of extant literature, theoretical modelling and refinements. Established measures for influence mechanisms, absorptive capacity and e-procurement assimilation were adapted from existing literature with little modification. However, value for money and stages of the tendering process were developed anew. All constructs were measured using a 5- point scale with 1 = strongly disagree and 5 = strongly agree except normative pressure where 1 = very low and 5 = very high. Details of the types of the questions and how they ought to be responded to are found in Appendix A. This study deviated a little bit from usual measurement scale of absorptive capacity as developed by Cohen and Levinthal (1990) and reconceptualised by Zahra and George (2002), Lane et al (2006), Todorovan and Durisin (2007) and Volberda et

al. (2010) to adopt the construct developed by Tu et al. (2006) and used by Kauppi et al. (2013). This is due to the fact the study seeks to use a construct which is more procurement and purchasing specific. The Kauppi et al. (2013) construct of absorptive capacity for purchasing comprises five sub-constructs – manager’s competence, buyer’s competence, communication climate, communication network, and knowledge scanning. But this current study believes that in the practice of public procurement, users play a crucial role because it is their demand and request that triggers the process and their knowledge is a capacity that cannot be ignored. Therefore, user’s prior knowledge is added as the sixth sub-construct of absorptive capacity. Furthermore, manager’s competence, buyer’s competence and user’s competence are put together as prior knowledge (PK) with 12 items (4 each). Additionally, 6 items, 6 items and 7 items are used to measure communication climate, communication network, and knowledge scanning respectively.

Table 4.2 Measurement Items for Absorptive Capacity

Construct	Type	Order	No. of items	Source
Management competence	Reflective	1 st order	4	Tu <i>et al.</i> , (2006). Mata <i>et al.</i> (1995)
Buyer competence	Reflective	1 st order	4	Tu <i>et al.</i> , (2006), Kauppi et al (2013)
Communications climate,	Reflective	1 st order	6	Tu <i>et al.</i> , (2006), Kauppi et al (2013)
Communications network	Reflective	1 st order	6	Tu <i>et al.</i> , (2006), Kauppi et al (2013)
Knowledge scanning.	Reflective	1 st order	7	Tu <i>et al.</i> , (2006), Kauppi et al (2013)
User competence	Reflective	1 st order	4	Marcolin et al (2000) and Yoon (2009)

The influence mechanisms constructs are measured in terms of extent to which coercive, mimetic and normative pressures influence both institutional absorptive capacity and e-procurement assimilation. The study adapted the measures from Liang et al. (2007). The original measures of Liang et al. (2007) is made of 3-item scale each of coercive, mimetic and normative pressures but this study added one (1) more item to the coercive isomorphism, i. e. “*the trends in doing business today requires us to automate all or aspects of the procurement function*”. This item is significant in that the trends in doing business in the global marketplace

has changed and is continually changing, putting pressure on organisations to build capacity and to adopt and assimilate IT application in their operations.

Table 4.3 Measurement Items for Influence Mechanisms

Construct	Type	Order	No. of items	Source
Coercive Pressure	Reflective	1 st order	4	Liang et al (2007)
Mimetic Pressure	Reflective	1 st order	3	Liang et al (2007)
Normative Pressure	Reflective	1 st order	3	Liang et al (2007)

A 5-item Guttman scale is used to capture assimilation of e-procurement in the public sector. The respondents were asked to identify the extent of IT usage in the procurement process. The current study modifies the scale from the traditional Likert scale to a matrix (see appendix 1), where respondents were asked to match the stages of assimilation (i. e. awareness, interest, evaluation/trial, commitment, limited deployment and general deployment) with the steps in the tendering process. Ten (10) steps of the tendering process are identified and grouped into 3 phases – *pre-tendering*, *tendering* and *post-tendering phases* (OECD 2009). The measurement items of assimilation are deemed to be formative as the dimensions are viewed as defining the characteristics of assimilation and any change in the dimensions would lead a change in the focal construct (e-procurement assimilation) (MacKenzie et al. 2011).

Table 4.4 Measurement Items for E-Procurement Assimilation

Construct	Types	Order	No. of items	Source
Awareness	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)
Interest	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)
Evaluation/trial	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)
Commitment	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)
Limited deployment	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)
General deployment	Formative	1 st order	10	Fichman and Kemerer (1997) and Rai et al. (2009)

The measurement instrument of value for money is developed from the scratch. A thorough literature review shows that there is no specific measure of value for money, though various authors have tried to deduce the sub-constructs of value for money as indicated in table 3.4. As a result, this study closely followed the scale development procedure outlined by Mackenzie et al. (2011) and Churchill (1979) and used by Hoehle and Verkalesh (2015) and Li et al. (2005). The fundamental requirement for a good measure is content validity, and Churchill (1979) argues that the measurement items of the construct should cover the major content of the construct. This study finds that value for money construct is multidimensional and *formative*. This is because the dimensions are viewed as defining characteristics of value for money and a change in any of the dimensions will lead to a change in the focal construct (MacKenzie et al. 2011).

To achieve content validity, several steps were followed. First, a comprehensive literature on value for money was reviewed and it was found that different authors have identified different ways of measuring value for money as captured in table 3.4. It was upon this basis that the measures of value for money were identified. At the same time two practitioners were asked to define value for money from the user's perspective in the context of public procurement. The user's perspective was crucial as all the value for money literature looked at it from the buyer's perspective and were silent on the user's perspective. This step is in congruence with Churchill's (1979) and Mackenzie et al. (2011) construct items development.

Second, the initial measurement items were reviewed by way of pre-test by two academicians and six practitioners who have been at the forefront of public sector procurement in their respective organizations. These individuals were asked to comment on two issues – 1) the appropriateness of the sub-constructs and 2) appropriateness of the measurement items for each sub-construct. They were also asked to do a face validity check of the items since they were developed from scratch to ensure simplicity of wording to aid understanding (Mackenzie et al. 2011; Straub et al. 2004). Based on the feedback from these people and their agreement with the sub-constructs, some of the measurement items were modified or dropped and new ones developed. Overall, three second-order constructs, namely, quality-cost dimension, productivity and impact dimension, and rule-based dimension, were identified and agreed to by the 8 experts as well as nine first-order constructs (namely quality, cost, efficiency, effectiveness, competitiveness, accountability, transparency, fairness, professionalism and

ethical and environmental issues). Altogether, 25 items were initially developed to capture all the essential aspects of the value for money construct.

Third, a pilot study was conducted based on the technique by Hinkin and Tracey (1999) as recommended by Mackenzie et al (2011) and used by Yao et al. (2008). In this regard, a matrix is constructed in which definitions of the sub-constructs (first-order constructs) are listed at the top of the columns and items are listed in rows as in appendix D. Fifty (50) raters were selected to rate the extent to which each item represents the sub-constructs of value for money using a five-point Likert-type scale ranging from 1 (not at all) to 5 (completely). Out of which 47 responses were returned. The data gathered from Appendix D was later transposed into another matrix as captured in Appendix E. Because each rater made multiple ratings for each item, a one-way ANOVA was used to assess whether an item's mean rating of one sub-construct differ from its rating on another sub-construct.

Firstly, Anderson and Gerbing's Proportion of substantive agreement (P_{SA}) and substantive validity coefficient (C_{SV}) were used. These indexes have also been used by Hoehle and Venkatesh (2013), Yao et al (2008) and Farrell, Souchon and Durden (2001). Proportion of substantive agreement is defined as the proportion of the respondents who assign an item to its intended construct while substantive validity coefficient is the extent to which respondents assign an item to its posited construct more than any other construct (Anderson and Gerbig, 1991). The Proportion of substantive agreement is calculated as

$$PSA = \frac{nc}{N}$$

Where n_c is the number of respondents that have an item to its intended construct and N is the total number of respondents. Proportion of substantive agreement varies between 0.0 and 1.0 but the higher the better. The substantive validity coefficient is computed as

$$CSV = \frac{nc - n_o}{N}$$

Where N and n_c are the same as defined before and n_o is the highest number of assignments of the item to any other construct other than the intended. Substantive validity coefficient values range from -1.0 to 1.0, the larger value represents substantive validity. As indicated by Anderson and Gerbig (1991), the value for proportion of substantive agreement should exceed the minimum threshold of 0.5 whilst substantive validity coefficient should exceed 0.00. Table

4.5 contains the proportion of substantive agreement (P_{SA}) and substantive validity coefficient (C_{SV}) values for the dimensions and measurement items after initial iteration.

Table 4.5 Proportion of Substantive Agreement and Substantive Validity Coefficient Analysis

VFM DIMENSION	N	P_{SA}										C_{SV}
		QTY	CST	EFFI	EFFE	COM	F&T	ACCT	ETHICS	ENVT	PROF	
COST 1	47	0.29	0.59	0.40	0.38	0.45	0.32	0.38	0.36	0.23	0.45	0.14
COST 3	47	0.32	0.55	0.43	0.32	0.29	0.21	0.36	0.34	0.17	0.26	0.12
COST 4	47	0.29	0.49	0.49	0.34	0.29	0.21	0.28	0.23	0.21	0.29	0.00
EFF 14	47	0.43	0.49	0.29	0.34	0.19	0.19	0.23	0.17	0.26	0.36	0.19
QUAL1	47	0.40	0.29	0.36	0.38	0.19	0.21	0.28	0.19	0.23	0.29	0.02
QUAL2	47	0.47	0.32	0.32	0.38	0.17	0.26	0.29	0.21	0.15	0.23	0.09
QUAL4	47	0.53	0.46	0.46	0.53	0.26	0.38	0.34	0.23	0.36	0.51	0.02
COST6	47	0.51	0.55	0.47	0.40	0.29	0.28	0.23	0.17	0.23	0.32	0.06
EFFE2	47	0.62	0.34	0.55	0.66	0.34	0.32	0.36	0.34	0.47	0.45	0.04
COMP1	47	0.47	0.44	0.53	0.55	0.72	0.59	0.49	0.40	0.57	0.53	0.13
COMP2	47	0.36	0.34	0.40	0.40	0.64	0.51	0.44	0.34	0.43	0.53	0.11
TF1	47	0.45	0.40	0.57	0.51	0.66	0.72	0.47	0.36	0.51	0.68	0.04
TF2	47	0.45	0.34	0.51	0.55	0.68	0.74	0.36	0.42	0.51	0.49	0.06
ENV1	47	0.28	0.28	0.36	0.38	0.27	0.36	0.38	0.59	0.68	0.61	0.09
ET1	47	0.32	0.26	0.47	0.47	0.34	0.49	0.36	0.70	0.55	0.68	0.13
PROF1	47	0.53	0.40	0.49	0.38	0.32	0.51	0.49	0.47	0.62	0.79	0.17
ACC1	47	0.29	0.21	0.36	0.36	0.29	0.26	0.70	0.49	0.64	0.77	0.07
PROF2	47	0.38	0.40	0.51	0.51	0.32	0.26	0.28	0.28	0.53	0.85	0.32

The threshold value for P_{SA} and C_{SV} have been determined differently from the original $P_{SA} = 0.5$ and $C_{SV} \Rightarrow 0.00$. Flores and Antonsen (2013) used $P_{SA} = 0.30$ and $C_{SV} = 0.30$, whilst Yao et al. (2008) used $P_{SA} = 0.30$ and $C_{SV} = 0.25$. This study adopted the P_{SA} value of 0.30 as is widely used and maintains the original C_{SV} value of >0.00 . But all items with negative C_{SV} values were removed with the exception of those where respondents perceived them to measure other construct other than the intended. For instance, EFF1 was moved to cost dimension, COST6 was moved to efficiency dimension whiles ACCT1 was moved and added to professionalism dimension. The movement of ACCT1 erased accountability dimension as a standalone dimension of value for money via the rule-based route. In a similar fashion, item ET1 originally measuring ethical concerns was swapped with ENV1 under environmental concerns. This is due to the fact that ET1 confounded more with environmental concerns dimension whiles ENV1 also confounded rather more with ethical concerns as it did for its

intended construct, as indicated by the initial P_{SA} and C_{SV} value. The C_{SV} values were recalculated and registered positive values greater than 0.00. In effect the following items were eliminated due to their P_{SA} and/or C_{SV} values not meeting the thresholds. These are COST2, COST5, QUAL3, EFF1, EFF2, EFF3 and EFFE1. At the end of this level of analysis, the number of items reduced from original 25 to 18 and the dimensions of value for money also dropped from the original 10 to 9.

Table 4.6 One-Way ANOVA

VFM Dimension	R^2	Mean	SD	1	2	3	4	5	6	7	8	9
Cost	.26	3.50	1.37	1								
Quality	.20	3.21	1.50	.028	1							
Efficiency	.003	3.14	1.28	-.033	.052	1						
Effectiveness	.27	3.56	1.23	.112	.148*	-	1					
						.062						
Competitiveness	.25	3.86	1.14	-.022	.141	-	.403**	1				
						.108						
Transparency/ Fairness	.52	4.01	1.03	.103	.171	.001	.388**	.494**	1			
Ethical Concerns	NA	3.63	1.20	.257*	.074	.193	.094	.120	.126	1		
Environmental Concerns	NA	3.39	1.32	-.115	-.059	.017	.019	-.021	.021	.280**	1	
Professionalism	.39	4.19	1.07	.038	.334**	.046	.276**	.259*	.388**	.073	.023	1

The second level of analysis was to determine the appropriateness of the measurement items on each of the value for money dimensions using a one-way ANOVA as suggested by Hinken and Tracey (1999) and MacKenzie et al. (2011) and used by Yoa et al. (2013). The rationale is to find out whether indeed the measurement items as filtered in table 4.6 are appropriate for the posited dimensions. The results are presented in table 4.6 It revealed significant R^2 values of all the dimensions except efficiency ($R^2 = 0.003$). This could be attributed to the fact that all the original items of efficiency recorded insignificant P_{SA} and C_{SV} values and were scrapped and item COST6 was moved from cost dimension to efficiency dimension. Ethical concerns and environmental concerns dimensions recorded no R^2 values because they were both measured by an item each. The correlation result also shows significant relationships between the measurement items and their posited dimensions.

A further analysis (one-way ANOVA) was carried out to the effect of efficiency on whole-life cost (CIPSA, 2005; Barnet, 2010) and effectiveness on quality (Ross, 2005). As presented in

table 4.7 it is evidenced that when the only item of efficiency was added to measure cost, the R^2 for cost increased from 0.26 to 0.262 while that of quality increased from 0.20 to 0.29 with significant F-Test values. As a result, the only item measuring efficiency was moved to measure cost and those of effectiveness moved to measure quality. This, in the end, further reduced the value for money dimensions from 9 to 7 as indicated in table 4.7.

Table 4.7 One-Way ANOVA (Final Iteration)

VFM Dimension	R^2	$F(df_1, df_2)$	Mean	SD	1	2	3	4	5	6	7
Cost	.262	$F(4.736) = 40.00^{**}$	3.385	1.3500	1						
Quality	.291	$F(5.463) = 40.00^{**}$	3.291	1.4633	.123	1					
Competitiveness	.258	$F(15.284) = 44.00^{**}$	3.848	1.1477	.055	-.117	1				
Transparency/Fairness	.534	$F(50.508) = 44.00^{**}$	4.000	1.0377	.055	.136	.489*	1			
Ethical Concerns	NA	NA	3.543	1.1871	.503*	.127	.188	.173	1		
Environmental Concerns	NA	NA	3.244	1.4167	-.087	-.207	-.125	-.109	.307*	1	
Professionalism	.387	$F(13.276) = 42^{**}$	4.118	1.1226	.105	.160	.281*	.460**	.384**	.155	1

In the end 18 items, 9 each of the two first order constructs of value for money were used as indicated in table 4.8

Table 4.8 Measurement Items for Value for Money

Construct	Types	Order	No. of items	Source
Economic Dimension	Reflective	1 st order	9	World Bank, 2003; CPFM, 2004), Rutter and potter 2003; Kestenbaum and Straight, 1998; CIPSA (2005); Barnett et al (2010)
Rule-Based Dimension	Reflective	Reflective	9	Public Procurement Manual 2003) Raymond (2008) Raiser (2014), Raymond (2008) Atkinson (2003)

A 5-point Likert scale was used to measure procurement (tendering) process. The rationale is to assess whether public sector organisations follow the best practices in public procurement tendering. This study adopted the procurement process of OECD, made up of ten (10) sequential activities (OECD 2009). The procurement process is categorized into *pre-tendering*,

tendering and *post-tendering* phases. Six (6) items are used to measure pre-tendering and tendering phases, while five (5) for post-tendering phase, as indicated in table 4.9.

Table 4.9 Measurement Items for Procurement Process

Construct	Types	Order	No. of items	Source
Pre-tendering	Reflective	1 st order	6	OECD (2009)
Tendering	Reflective	1 st order	6	OECD (2009)
Post-tendering	Reflective	1 st order	5	OECD (2009)

4.5 Data Analysis

4.5.1 Choice of Analytic Method

Structural Equation Modelling (SEM) is used to assess the hypothesized causal paths among the constructs. SEM is a family of statistical procedures that analyses multiple relationships among latent constructs using equations quite similar to multiple regression equations (Hair et al. 2010). In contrast with simple regression, SEM can model relationships among multiple independent and dependent constructs simultaneously in a systematic and comprehensive way with great speed (Gerbing and Anderson 1988; Hair et al. 2010). SEM is a preferred choice among analytic methods where research designs include complex models similar to the model presented in this research because it estimates multiple interrelated dependence relationships at one time. This makes it different from linear regression which can analyse only one layer of relationship between independent variables and one dependent variable at a time. Similar to linear regression, SEM calculates the coefficients among causal relationships (Hair et al., 2010). It also helps researcher to examine the standardized loadings of observed items on latent variables and provides fuller information on how the research model is supported by the data collected compared to regression techniques (Hair et al., 2010; Gefen et al. 2000). Analysing a complex (multi-layer) research model, similar to the one presented in this research, in SEM rather than linear regression results in a more rigorous analysis because it enables the measurement errors of the observed variables to be analysed as an integral model (Gefen et al. 2000). To test a multi-layer research model in linear regression, research must divide and test each layer at time; however, in SEM all layers will be assessed in one test.

Two distinct approaches are mostly used within the family of SEM methods which are the covariance-based and the variance-based techniques. These two types of SEM “differ in the

objectives of their analyses, the statistical assumptions they are based on, and the nature of the fit statistics they produce” (Gefen et al. 2000, p. 24). These differences are explained in the next paragraphs.

The objective of covariance-based SEM is to show that the proposed research model being analysed with all its relationships is plausible given the sample data (Gefen et al. 2000). In other words, the objective of covariance-based SEM is to demonstrate that the operationalization of the model being assessed is corroborated by the data (Bollen 1989, Hair et al. 2010). Covariance-based technique minimizes the difference between the covariance of the sample collected and those of the predicted covariance matrix (Haenlein and Kaplan 2004). The predicted covariance matrix is derived from the path (direct and indirect) estimates of the model (Hair et al. 2010). Thus, a covariance-based SEM reproduces the covariance matrix of the observed variables (Chin and Newsted 1999). In other words, an estimated covariance between two latent factors will be equal to the total of coefficients of all direct and indirect paths between the two factors. When a proposed research model is based on a sound theoretical base, the overall objective will be theory testing (Gefen et al. 2000). The difference between the observed and predicted covariance matrices indicates the level of model fit (Hair et al., 2010). Covariance-based SEM techniques are best suited for confirmatory research because they emphasize the overall fit of the observed covariance matrix with the predicted covariance model (Bollen 1989, Gefen et al. 2000; Hair et al. 2010).

The objective of variance-based SEM (PLS) is to maximize “the variance of the dependent variables explained by the independent variables instead of reproducing the empirical covariance matrix” (Haenlein and Kaplan 2004, p. 290). In other words, the variance-based SEM is designed to explain variance such as the significance of the coefficients of relationship and R-square, which makes it similar to linear regression (Gefen et al. 2000). For this reason, the variance-based SEM techniques are best suited for predictions (Gefen et al. 2000; Hair et al. 2010).

Because each technique uses different algorithm, results given by both methods tend to be different (Gefen et al. 2000; Goodhue et al. 2012). As the purpose of this study is to examine the factors that drive e-procurement assimilation and value for money, not necessarily theory testing but exploration in nature, PLS approach was deemed more appropriate. Further, the

model contains a formatively measured construct (E-procurement Assimilation), and as covariance-based SEM cannot run formative constructs, PLS-SEM was the selected analytic approach.

4.6 Chapter Summary

This chapter describes the approach and methodology appropriate for this study, specifically, the design, philosophy, strategy, approach and purpose. This study takes the positivist stance, deductive approach and quantitative design. It further describes the data collection procedure in terms of population, sampling and instrumentation. It finally describes constructs measurement and data analysis techniques and process. The next chapter will present, analyse and discuss the results of data collected.



CHAPTER FIVE

RESULTS AND DISCUSSION

5.1 Introduction

This chapter presents the data analyses, results and discussion of the results in line with the hypotheses and research model. The chapter is presented in major five parts, namely; (i) Demographics and respondents' profile, (ii) Descriptive statistics of constructs, (iii) Measurement model results, (iv) Structural model results, and (v) Multi-group analysis of industry effects.

5.2 Demographics and Respondents' Profile

As part of the study, demographic information of the participating respondents and their firms was collected. This section presents the demographic characteristics of the participants of the study which is used as a basis to make further inferences from the responses. Table 5.1 presents the respondents' demographic characteristics such as gender, age, number of years spent with organisation, level of respondent's education, industry, and role description.

Table 5.1 Demographics of Respondents

Demographic		Frequency	Percent
Gender	Male	217	71.92
	Female	89	29.08
	Total	306	100
Age	Less than 30 years	38	12.41
	31-40	120	33.33
	41-50	101	28.05
	>50	47	13.05
	Total	306	100
Educational Level	Secondary	6	1.96
	First degree	116	37.91
	Second degree	122	39.87
	Professional	62	20.26
	Total	306	100
Number of years spent at the industry	Less than 6	74	24.18
	6-10	109	35.62
	11-15	63	20.59
	16-20	35	11.44
	More than 20	25	8.17
	Total	306	100
Role Description	Chief Director	33	10.78
	Director/ Deputy Director	19	6.21

	Finance Officer/Deputy Finance	28	9.15
	Accountant	104	33.99
	Procurement Director /officer/Deputy	32	10.78
	Head of Stores	28	9.15
	Head of User department	20	6.54
	Head, operations	38	12.42
	Others	4	1.31
	Total	306	100
Industry	Classical	87	28.43
	Project based	60	19.60
	Local-government	113	36.93
	State-owned enterprise.	46	15.03
	Total	306	100

Firstly, it can be seen from the table that males (n=217 representing 71.92%) had a larger representation of the respondents than females (n=89 representing 29.08%). This is not surprising as existing data shows that there are more male workers in the public sector (Commonwealth Secretariat 2015). Secondly, respondents of the study were grouped according to certain age ranges as presented on the Table 5.1. It can be observed that most of the respondents were within the age groups of 31-40 years (n=120 which represents 33.33% of the sample). This indicates that majority of the respondents are in the age range considered as the generation y category. The generation y age group are identified as the first *generation* to have spent their entire lives in the digital environment. Considering the nature of this study, having majority of such age group is an added advantage. Thirdly, it can be observed that majority of the respondents had obtained second degree (n=122 representing 39.87%). Following this number are those who had obtained first degree (n=116), professional education (n=62), and secondary education (6) in that order.

Additionally, majority of the respondents were accountants (n=104 representing 32.9%). The study grouped the industry into classical, project based, local-government and state-owned enterprise. Majority of the respondents were within the local government (113 representing 36.93%). Following this are those within the classical (87 representing 28.43%), project based (60 representing 19.60%) and state-owned enterprise (46 representing 15.03%) in a respective order. Lastly, the results from the table shows that majority of the respondents (n=109 representing 35.62%) had spent 6-10 years at their respective industries. This is followed by those who had less than 6 years working experience with their industry (n=74 representing 24.18%), 11-15 years, 16-20 years and above 20 years respectively. It can be inferred from this

finding that majority of the respondents used for the study had obtained the necessary work experience to provide data reflective of the real on ground situation.

5.3 Descriptive Statistics of Construct

5.3.1 Institutional Absorptive Capacity

The study examined the impact of institutional absorptive capacity on e-procurement assimilation. Therefore, it was necessary to examine the extent of institutional absorptive capacity at the selected organisations. Existing literature on the subject area were consulted to develop items to measure the construct. Prior Knowledge, Communication Network, Communication Climate and Knowledge Scanning were used as proxies to measure Institutional absorptive capacity. The various items were measured using a 5-point Likert scale where 1 indicated “strongly disagree” and 5 indicated “strongly agree” at the extreme end. The results of the analysis of are shown in the Tables 5.2, 5.3, 5.4 and 5.5.

Table 5.2 Prior Knowledge

Items	Min	Max	Mean	S.D
1. The general knowledge level of our procurement staff is high	1	5	4.03	.91
2. The overall technical knowledge of our procurement staff is high	1	5	3.95	.84
3. The general educational level of our procurement staff is high	1	5	4.05	.83
4. The overall job competence of our procurement staff is high	1	5	4.02	.85
5. The knowledge of our managers is adequate when making procurement decisions	1	5	3.89	.95
6. The knowledge of our managers is adequate when dealing with new technologies	1	5	3.65	.88
7. The knowledge of our managers is adequate when managing daily operations	1	5	4.01	.84
8. The knowledge of our managers is adequate when solving technical problems in relation to IT and procurement function	1	5	3.57	.92
9. The general business knowledge of our end-users is high	1	5	3.51	.98
10. The technical knowledge of our end-users in their line of duty is high	1	5	3.52	1.00
11. The knowledge of our end-users in the procurement function is high	1	5	3.27	.98
12. The knowledge and competence of our end-users in IT application is high	1	5	3.20	1.03
Overall Mean			3.72	.60

From the table 5.2, it can be seen that overall mean for the construct is 3.72 which depicts a unanimity among the respondents that, their organisation has employees with prior knowledge of procurement. The table also shows that the third item “the general education level of our procurement staff is high” recorded the highest mean (4.05). This generally indicates that majority of the employees agreed that the general education of their procurement staff is high. On the other hand, the last item “the knowledge and competence of our end-users in IT application is high” was the least scored with a mean of 3.2 and a standard deviation of 1.03. This implies that majority of the respondents neither agreed nor disagreed to the end users of their IT applications having high knowledge and competence. In addition to this construct the last but one item “the knowledge of our end-users in the procurement function is high” was neither agreed nor disagreed to (Mean 3.27 and Standard Deviation 0.98). Apart from these two items all the other items were agreed to.

Table 5.3 Communication Network

Items	Min	Max	Mean	S.D.
1. The communications between supervisors and their subordinates are extensive	1	5	3.74	.98
2. The communication among functional areas are extensive	1	5	3.71	.87
3. The communication among functional areas are frequent	1	5	3.66	.90
4. The communication between supervisors and their subordinates are frequent	1	5	3.78	.92
5. The communication of new ideas from one department to another is extensive	1	5	3.44	.99
Overall Mean			3.67	.72

Source: Author’s Field Data, 2019

It can be observed from Table 5.3 that the highest-scoring item was “the communication between supervisors and their subordinates are frequent” with a reported mean score of 3.78 and a standard deviation of 0.92. Furthermore, the item with the lowest mean item was “the communication of new ideas from one department to another is extensive”, with a mean score of 3.53 and a standard deviation of 0.48. The overall mean score of 3.67 and standard deviation of 0.72 shows an agreement of respondents that their organisation has good communication network.

Table 5.4 Communication Climate

Items	Min	Max	Mean	S.D
1. Our employees tend to trust each other	1	5	3.30	1.07
2. Our employees are supportive of each other	1	5	3.65	.95
3. Our employees have strong feelings of belonging to our organization	1	5	3.61	1.00
4. Our employees share ideas freely with each other	1	5	3.56	1.03
5. Our employees have no difficulty accepting new ideas	1	5	3.57	1.04
6. Our employees are willing to accept changes	1	5	3.48	1.05
Overall Mean			3.54	.82

From the table 5.4, it can be observed that the construct had an overall mean of 3.54 and a standard deviation of 0.82. This indicates a consensus among the respondents that their organisation has a positive communication climate. Again, the table shows that the second item “our employees are supportive of each other” recorded the highest mean of 3.65 with a standard deviation of 0.95. This implies that majority of the respondents agree that employees in their organisation are supportive of each other. Likewise, lowest mean was recorded on the first item “our employees tend to trust each other” with a mean of 3.30 and a standard deviation of 1.07. This implies that majority of the respondents were unsure whether there was trust among employees in their organisation.

Table 5.5 Knowledge Scanning

Items	Min	Max	Mean	S.D
1. We seek to learn from tracking new operational trends in our industry	1	5	3.69	.91
2. We seek to learn from routine search of useful information regarding the supply market	1	5	3.73	.95
3. We seek to learn from benchmarking best practices in our industry	1	5	3.75	.90
4. We seek to learn from trying out new technologies	1	5	3.70	.92
5. We seek to learn from our clients and suppliers	1	5	3.70	.92
6. We seek to learn from taking new business opportunities	1	5	3.62	.98
7. We seek to partner research institutions to learn new knowledge	1	5	3.41	1.12
Overall Mean			3.66	.74

As shown on the table 5.5, the construct had an overall mean of 3.66 and a standard deviation of 0.74. This depicts an agreement among most of the respondents that their organisation practice knowledge scanning. The table also shows that the third item “we seek to learn from benchmarking best practices in our industry” reported the highest mean score of 3.75 and a

standard deviation of 0.90. This indicates most of the respondents agreed that their organisation always seek to learn from benchmarking best practices in the industry. Likewise, lowest mean was recorded on the last item “we seek to partner research institutions to learn new knowledge” with a mean of 3.41 and a standard deviation of 1.12. This implies that majority of the respondents were unsure their organization sought to partner research institutions to learn new knowledge.

5.3.2 Institutional Mechanisms

This section examines the institutional mechanisms the selected organisations used for the study faced. Existing literature on the subject area were consulted to develop items to measure the construct. Institutional Mechanisms was measured in terms of Coercive, Mimetic, and Normative pressures. The various items were measured using a 5-point Likert scale where 1 indicated “strongly disagree” and 5 indicated “strongly agree” at the extreme end. The results of the analysis of are shown in the Tables 5.6, 5.7, and 5.8.

Table 5.6 Coercive pressure

Items	Min	Max	Mean	S.D
1. The sector ministry requires us to automate our procurement activities	1	5	3.67	1.04
2. the public procurement authority requires us to automate all or some aspects of the procurement function	1	5	3.83	.94
3. The trends in doing business today require us to automate our operations	1	5	4.04	.84
4. Some of our suppliers have already automated their systems	1	5	3.49	.99
Overall Mean			3.76	.69

From the table 5.6, it can be observed that the highest-scoring item was “the trends in doing business today require us to automate our operations”. This indicates that majority of the respondents agree that their organisations need to automate their operations to meet the demands of current business trends. Furthermore, the item with the lowest mean was “some of our suppliers have already automated their systems”, with a mean score of 3.49 and a standard deviation of 0.99. Again, it can be observed from the table that all the items used to measure the construct were agreed to by most of the respondents. Lastly, the construct had an overall mean score of 3.76 and a standard deviation of 0.69. This indicates a consensus among the respondents that there exist coercive pressures in their industry.

Table 5.7 Mimetic pressure

Items	Min	Max	Mean	S.D
1. Other public entities which have adopted IT in their procurement have greatly benefited	1	5	3.90	.88
2. Other public entities which have adopted IT in their procurement are favourably perceived by suppliers and clients	1	5	3.66	.85
3. Other public entities which have adopted IT in their procurement are favourably perceived by the regulator (PPA)	1	5	3.76	.88
Overall Mean			3.78	.74

Source: Author's Field Data, 2019

As shown on the table 5.7, the construct had an overall mean of 3.78 and a standard deviation of 0.74. This depicts an agreement among majority of the respondents that the existence of mimetic pressure in their industry. The table also shows that the first item “other public entities which have adopted IT in their procurement have greatly benefited” reported the highest mean score of 3.90 and a standard deviation of 0.88. This indicates most of the respondents agreed that Information Technology has been of much benefit to public entities which have adopted it in their procurement. Likewise, lowest mean was recorded on the second item “other public entities which have adopted IT in their procurement are favourably perceived by the regulator” with a mean of 3.41 and a standard deviation of 1.12. This is an indication that majority of the respondents agreed that public entities which have adopted IT in their procurement are favourably perceived by the regulator. Generally, all the items were agreed to by the respondents.

Table 5.8 Normative pressure

Items	Min	Max	Mean	S.D.
1. The extent to which your organization shares the same vision with suppliers and other organizations in the same industry	1	5	3.35	.985
2. The extent to which your suppliers and clients use IT in their operations	1	5	3.25	.964
3. The extent to which the government's promotion of IT influences your organization to use automation in your procurement activities	1	5	3.56	.926
Overall Mean			3.39	.78

Source: Author's Field Data, 2019

From the table 5.8, it can be observed that the construct had an overall mean of 3.39 and a standard deviation of 0.7. This indicates that majority of the respondent neither agreed nor disagreed to most of the items used to measure this construct. The table also shows that the last

item “the extent to which the government’s promotion of IT influences your organization to use automation in your procurement activities” reported the highest mean score of 3.56 and a standard deviation of 0.93. This indicates that majority of the respondents agreed that government promotion Information Technology has an influence of their organizations use of automation in procurement activities. Again, the lowest mean was recorded on the second item “the extent to which your suppliers and clients use IT in their operations” with a mean of 3.25, which is above mid-point of 3.0 for a 5 - point Likert scale, and had a standard deviation of 0.96. Generally, above average levels of normative pressure was reported by the respondents.

5.3.3 E-Procurement Assimilation

The study examined the stages at which the various organizations used electronic procurement for each step of the procurement process. For this study, 5 stages were used as indicators. These stages are awareness, interest, evaluation, commitment and general deployment respectively. The results of the analysis are shown in the table 5.9.

Table 5.9 E-Procurement Assimilation

Procurement process	Stage of Assimilation	Frequency	Percent
Procurement needs and assessment	Awareness	34	11.0
	Interest	91	29.5
	Evaluation/trial	15	4.9
	Commitment	30	9.7
	Deployment	117	38.0
	Missing	18	6.5
	Total	308	100
Procurement Planning and budgeting	Awareness	24	7.8
	Interest	70	22.7
	Evaluation/trial	21	6.8
	Commitment	40	13.0
	Deployment	142	46.1
	Missing	9	3.2
	Total	308	100
Specifying requirements and requisition	Awareness	26	8.4
	Interest	84	27.3
	Evaluation/trial	24	7.8
	Commitment	38	12.3
	Deployment	107	34.7
	Missing	17	9.1
	Total	308	100
Choosing the procurement procedure	Awareness	25	8.1
	Interest	89	28.9

	Evaluation/trial	28	9.1
	Commitment	33	10.7
	Deployment	107	34.7
	Missing	24	8.1
	Total	308	100
Requesting quotation/proposal and inviting bids	Awareness	26	8.4
	Interest	97	31.5
	Evaluation/trial	16	5.2
	Commitment	31	10.1
	Deployment	113	36.7
	Missing	23	7.8
	Total	308	100
Evaluating bids	Awareness	25	8.1
	Interest	101	32.8
	Evaluation/trial	25	8.1
	Commitment	26	8.4
	Deployment	85	27.6
	Missing	44	14.6
	Total	308	100
Purchase Order placement	Awareness	38	12.3
	Interest	80	26.0
	Evaluation/trial	19	6.2
	Commitment	28	9.1
	Deployment	118	38.3
	Missing	23	7.8
	Total	308	100
Award and notification of contract award	Awareness	26	8.4
	Interest	103	33.4
	Evaluation/trial	12	3.9
	Commitment	35	11.4
	Deployment	107	34.7
	Missing	23	7.8
	Total	308	100
Monitoring/follow-up/expediting of contract	Awareness	21	6.8
	Interest	100	32.5
	Evaluation/trial	20	6.5
	Commitment	32	10.4
	Deployment	101	32.8
	Missing	32	10.7
	Total	308	100
Payment	Awareness	28	9.1
	Interest	69	22.4
	Evaluation/trial	22	7.1
	Commitment	33	10.7
	Deployment	133	43.2
	Missing	21	7.1
	Total	308	100

From the Table 5.9 it can be observed that 117 of the respondents representing 38% rated their organisation to be at the “**general deployment**” stage with respect to the used of e-procurement for procurement needs assessment. This is followed by 91(29.5%) who rated their organisation at the “**interest**” stage, 34(11%) who rated their organisation at “**awareness**” stage, 30(9.7%) rating their organisation at the “**commitment**” stage and 15(6.8%) rating their organisation at the “**evaluation**” stage respectively. Reading from the results above, it can be implied that most of the organisations used for the study were much advanced with regards to the practice of procurement needs and assessment.

Also, with regards to “**procurement planning and budgeting**” majority of the respondents (n=142 representing 46.1%) indicated that their organisation was at the “**general deployment**” stage. For each process the term “**missing**” represents the number of respondents who did not indicate any answer. Among the list of procurement processes identified on the table above “**Procurement Planning and budgeting**” recorded the highest number at the “**general deployment**” stage. On the other hand, “**Evaluating bids**” recorded the lowest number at the at the “**deployment**” stage. This notwithstanding, the table clearly reveals that majority of the organisations were at the general deployment stage for all procurement processes except evaluation of bids, where majority of the respondents indicated they were at the “**Interest**” stage. This is an indication that the respondents were affirmative that their organization had seen much progress in the use of e-procurement for all the procurement process examined in this study.

5.3.4 Value for Money

This section examines the value for money of procurement activities of the selected organisations used for the study. Existing literature on the subject area were consulted to develop items to measure the construct. Value for Money was measured in terms of economic dimension and rule-based dimension. The various items were measured using a 5-point Likert scale where 1 indicated “strongly disagree” and 5 indicated “strongly agree” at the extreme end. The results of the analysis of are shown in the Tables 5.10 and 5.11.

Table 5.10 Economic Dimension

Items	Min	Max	Mean	S.D
1. The price of a purchase/contract is the only determinant of total cost (<i>reverse coding</i>)	1	5	2.43	1.36
2. The cost of installation/warranty, training and other ancillary costs are not considered as part of total cost of a contract or purchase order(<i>reverse coding</i>)	1	5	2.45	1.36
3. The cost of running or operating e.g. maintenance, repairs etc. are not considered when determining total cost of a contract or purchase order(<i>reverse coding</i>)	1	5	2.61	1.35
4. The duration of contract execution, order or service delivery influences pricing	1	5	3.70	1.07
5. Final cost of project is always higher than planned/ budgeted	1	5	3.03	1.08
6. End users' requirements are largely missed at all times(<i>reverse coding</i>)	1	5	2.58	1.13
7. End users always complaint that the procured products/projects/services do not fit the purpose of their acquisition (<i>reverse coding</i>)	1	5	2.52	1.15
8. Monitoring and evaluation rarely influence procurement cost and quality (<i>reverse coding</i>)	1	5	2.91	1.22
9. The user rate of procured products/projects/services is satisfactory	1	5	3.69	.96
Overall Mean			2.88	.71

As shown on the table 5.10, the construct had an overall mean of 2.88 and a standard deviation of 0.71. This indicates that majority of the respondents neither agreed nor disagreed to most of the items used to measure the economic dimension construct. The table also shows that the fourth item “the duration of contract execution, order or service delivery influences pricing” reported the highest mean score of 3.70 and a standard deviation of 1.07. This implies that most of the respondents agreed that the duration of contract execution, order or service delivery has an influence on pricing. Likewise, lowest mean was recorded on the first item “the pricing of a purchase or contract is the only determinant of total cost” (reverse coded) with a mean of 2.43 and a standard deviation of 1.36. This indicates that majority of the respondents were of the view that the price of contract was not the only determinant of total cost.

Table 5.11 Rule-Based Dimension

Items	Min	Max	Mean	S.D
Most of our procurement activities are carried in a competitive manner	1	5	4.07	.91
Greater supplier/contractor/service provider participation in our bidding process	1	5	3.92	.96
An equal playing field is offered to all potential vendors, in all stages of the procurement process	1	5	3.89	1.02
Our procurement activities are accessible to all those who meet the eligibility criteria	1	5	3.99	1.00
Ethical issues are always considered at all stages in the procurement function	1	5	3.93	.93
Environmental issues are always considered at all stages in the procurement function	1	5	3.65	1.00
We make sure that only qualified and experienced officers are engaged in our procurement activities.	1	5	3.90	.91
There is a capacity building and training for staff in procurement which ensures new ways and best practices in the procurement function	1	5	3.80	.96
We are held responsible for their roles in all aspects of the procurement process	1	5	3.89	.84
Overall Mean			3.89	.68

From the table 5.11, it can be observed that the construct had an overall mean of 3.89 and a standard deviation of 0.68. This indicates that majority of the respondent agreed to most of the items used to measure this construct. Again, it can be observed from the table that the first item “most of our procurement activities are carried in a competitive manner” reported the highest mean score of 4.07 and a standard deviation of 0.91. This indicates that majority of the respondents agreed that procurement activities in their respective organization are carried out in a competitive manner. Again, the lowest mean was recorded on the sixth item “environmental issues are always considered at all stages in the procurement function” with a mean of 3.65 and a standard deviation of 1.00. This is an indication that majority of the respondents agreed that their respective organisations consider environmental issues at all stages in their procurement activities. Generally, all the items used to measure this construct were agreed to by the respondents.

5.3.5 The Procurement Process

This section examines the procurement processes of the selected organisations used for the study. The procurement processes were divided into three phases, namely pre-tendering phase,

tendering phase and post-tendering phase. Items for the various measures were adapted from existing literature. The various items were measured using a 5-point Likert scale where 1 indicated “strongly disagree” and 5 indicated “strongly agree” at the extreme end. The results of the analysis of are shown in the Tables 5.12, 5.13 and 5.14.

Table 5.12 Pre-tendering Phase

Items	Min	Max	Mean	S.D
1. We conduct needs analysis to assess the relevance of each procurement request	1	5	3.88	.92
2. We largely handle all procurement activities as captured in our annual procurement plan	1	5	3.90	.91
3. Procurement requirements and statement of works are specified way before tendering	1	5	4.05	.79
4. Procurement requirements and statement of works are specified not only in technical terms but functional and performance terms as well	1	5	3.96	.82
5. We choose the most appropriate procurement methods and procedures before actual tendering begins	1	5	4.08	.82
6. Pre-tendering meetings are always held in high-value and critical procurement activities with prospective suppliers	1	5	3.72	.95
Overall Mean			3.93	.60

As shown on the table 5.12, the construct had an overall mean of 3.93 and a standard deviation of 0.60. This depicts that majority of the respondents agree to the practice of pre-tendering phase activities in procurement at their organization. The table also shows that the first item “we choose the most appropriate procurement methods and procedures before actual tendering begins” reported the highest mean score of 4.08 and a standard deviation of 0.82. This indicates that majority of the respondents agreed that their organization choose the most appropriate procurement methods and procedures before actual tendering begins. Likewise, lowest mean was recorded on the last item “pre-tendering meeting are always held in high-value and critical procurement activities with prospective suppliers” with a mean of 3.72 and a standard deviation of 0.95. This is an indication that majority of the respondents agreed that their organization hold pre-tendering meeting in high-value. Generally, all the items were agreed to by the respondents.

Table 5.13 Tendering Phase

Items	Min	Max	Mean	S.D.
1. Procurement activities are communicated to prospective suppliers early enough using the appropriate media as prescribed by law.	1	5	4.07	.89
2. We use appropriate supplier information solicitation tools (e.g. RFQ, RFP, ITT, etc.) for all our procurement activities.	1	5	4.08	.85
3. We always evaluate bids/tenders to identify tenderers who have technical, legal, financial and managerial capacities to perform the intended contract.	1	5	4.08	.86
4. We sometimes conduct post-qualification assessment to ascertain the authenticity of documents presented.	1	5	3.79	.99
5. We negotiate with pre-qualified tenderers to agree on terms prior to award of contract.	1	5	3.70	1.00
6. We issue an award of contract to notify successful bidder/bidders and demand payment of performance security within the period of validity.	1	5	4.06	.87
Overall Mean			3.96	.67

From the table 5.13, it can be seen that the highest-scoring items were “we will use appropriate supplier information solicitation tool for all procurement activities” and “we always evaluate bid /tender to identify tenderers who have technical, legal, financial and managerial capacities to perform the intended contact” with respective means and standard deviations of 4.08(SD=0.85) and 4.08(SD=0.86) respectively. This indicates that majority of the respondents believe their organization utilize appropriate supplier information solicitation tool in their procurement activities. Also, most of the respondents agreed that their organization always evaluate bid /tender to identify tenderers who have technical, legal, financial and managerial capacities to perform the intended contact. Again, it can be observed that all the items were agreed to by the respondents.

Table 5.14 Post-tendering Phase

Items	Min	Max	Mean	S.D
1. For high profile procurement, a contract management team is formed to monitor the activities of contractors from time to time.	1	5	3.88	1.01
2. We have dedicated staff who follow up on orders to ensure quality and timely delivery.	1	5	4.04	.87
3. We make sure that any variations to original contract are estimated way before the start of any procurement activity and captured in the contract.	1	5	3.54	1.05
4. Payment of orders/contracts are made judiciously as pertained to the contract and avoid overruns.	1	5	3.71	1.02
5. For high profile works procurement, contractors are asked to observe the period of liability before final payment is made to them.	1	5	3.91	.89
Overall Mean			3.82	.71

As shown on the table 5.14, the construct had an overall mean of 3.82 and a standard deviation of 0.71. This depicts an agreement among most of the respondents that their organisations practiced post-tendering procurement processes. The table also shows that the third item “we have dedicated staff who follow up on orders to ensure quality and timely delivery” reported the highest mean score of 4.04 and a standard deviation of 0.87. This indicates the majority of the respondents agreed that their organisations have dedicated staffs who follow up on orders to ensure quality and timely delivery. Generally, it can be observed from the table that all the items were agreed to by the respondents.

5.4 Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis

5.4.1 Measurement Model Results

SEM requires examination of both measurement and structural models. Measurement models describe the relationships between measured variables and latent constructs or underlying factors. Structural models describe the relationships between the latent constructs themselves (Brewerton and Milward 2001). The measurement model was analysed by conducting the relevant tests and ensuring they meet the recommended specifications.

5.4.1.1 Tests of Convergent Validity

Convergent validity refers to the relationship between measures of a common construct and reflects the extent to which two measures capture the same information (Carlson and Herdman 2012). The more similar the information they capture, the more likely they are to produce

equivalent results. There is convergent validity when items measuring the same construct correlate highly with each other (Campbell and Fiske 1959). Convergent validity was assessed by ensuring there is adequate composite reliability, average variance extracted (AVE), and adequately high factor loadings as recommended (Komiak and Benbasat 2006; Hair et al., 2014). Convergent validity has traditionally been assessed using Cronbach's Alpha (Cronbach and Meehl, 1955), which is an evaluation of item variances and covariances to estimate how internally consistent a construct is, with a minimum alpha value of 0.7 recommended (Dijkstra and Henseler 2015). However, composite reliability has emerged as a more adequate test of internal construct consistency because (i) unlike Cronbach's Alpha, composite reliability makes no assumptions on equal item loadings, (ii) Cronbach's Alpha estimations are influenced by the number of items in the scale, and (iii) Cronbach's Alpha generally tends to underestimate internal consistency reliability (Hair et al., 2014). The recommended threshold for confirming adequate internal consistency using composite reliability is 0.7. In addition to passing the Cronbach's Alpha and composite reliability tests, all indicators should load highly (at least 0.60), and the AVE of all constructs should be at least 0.50 (Hair et al. 2014). The AVE is a measure of the overall mean value of the squared loadings of the indicators of a construct (Hair et al., 2014), and gives an indication of the communality of the construct. In other words, a construct with an AVE of more than 0.50 indicates that it explains more than half of the variance of its indicators. Finally, rho_A has recently emerged as an important reliability measure for PLS-SEM and is currently the only consistent reliability measure for PLS construct scores (Dijkstra and Henseler 2015), with a minimum rho_A value of 0.7 recommended. From Table 5.15, the Cronbach's Alpha values, Composite reliability values, and rho_A values for the constructs exceeded 0.7 as recommended (Hair et al. 2014; Dijkstra and Henseler 2015). Further, the AVEs for all the constructs exceeded 0.50 as recommended (Hair et al. 2014).

Table 5.15 Quality of research constructs

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
BK	0.825	0.832	0.884	0.658
CC	0.909	0.910	0.927	0.646
CN	0.842	0.845	0.894	0.679
COST	0.792	0.823	0.876	0.702
CP	0.730	0.731	0.847	0.649
KS	0.887	0.889	0.912	0.597
MK	0.807	0.808	0.874	0.634
MP	0.802	0.802	0.883	0.716
NP	0.732	0.739	0.848	0.650
POTP	0.768	0.768	0.866	0.683
PTP	0.707	0.710	0.872	0.773
QUAL	0.811	0.812	0.914	0.841
RUBASED	0.882	0.887	0.905	0.517
TP	0.832	0.838	0.889	0.667
UK	0.819	0.823	0.881	0.649

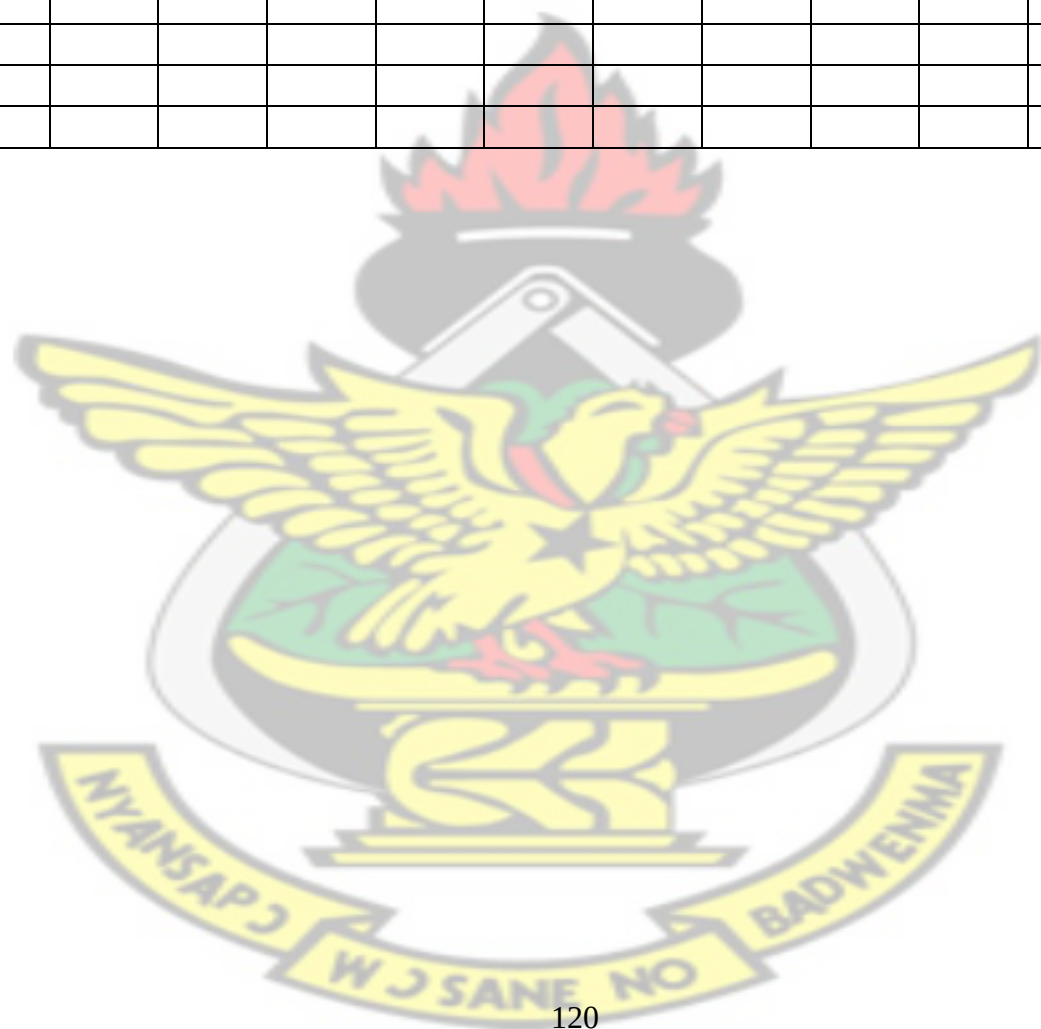
Ten items (CP4, CN5, ASS10, POTP3, POTP4, PTP1, PTP2, PTP4, QUAL_3, QUAL_4) were found to have low indicator loadings (less than 0.6) and were thus dropped. From Table 2, it can be seen that the loadings for the remaining item were greater than 0.6. Hence it is concluded that the research model possesses adequate convergent validity.

Table 5.16: Item loadings

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK1	0.876														
BK2	0.818														
BK3	0.733														
BK4	0.811														
CC1		0.774													
CC2		0.834													
CC3		0.798													
CC4		0.836													
CC5		0.842													
CC6		0.778													
CC7		0.763													
CN1			0.801												
CN2			0.823												
CN3			0.853												
CN4			0.818												
COMP1													0.751		
COMP2													0.668		
COST_1				0.789											
COST_2				0.856											
COST_3				0.867											
CP1					0.826										
CP2					0.819										
CP3					0.772										
ENV													0.666		
ET													0.786		
KS1						0.801									

KS2						0.744									
KS3						0.759									
KS4						0.778									
KS5						0.801									
KS6						0.785									
KS7						0.737									
MK1							0.783								
MK2							0.836								
MK3							0.795								
MK4							0.770								
MP1								0.850							
MP2								0.860							
MP3								0.828							
NP1									0.840						
NP2									0.795						
NP3									0.783						
POTP1										0.838					
POTP2										0.838					
POTP5										0.803					
PROF1												0.704			
PROF2												0.649			
PROF3												0.638			
PTP3										0.890					
PTP5										0.869					
QUAL_1											0.915				
QUAL_2											0.920				
TF1												0.804			
TF2												0.784			

TP1															0.883	
TP2															0.804	
TP3															0.837	
TP4															0.736	
UK1																0.798
UK2																0.783
UK3																0.856
UK4																0.784



5.4.1.2 Tests of Discriminant Validity

Next, the model was tested for adequate discriminant validity. Discriminant validity assessment has become a prerequisite for analysing relationships among variables in SEM (Henseler et al. 2014). Discriminant validity refers to the extent to which constructs are empirically distinct or separate from each other or, put otherwise, the constructs measure what they were supposed to measure (Hair et al. 2014). It assumes that items for a particular construct should correlate higher among themselves than they correlate with other items from other constructs that are theoretically not to correlate (Zait and Berteau 2011). Discriminant validity can be tested in three ways.

First, the Fornell-Larcker criterion (originally proposed by Fornell and Larcker 1981), which indicates the square root of the AVE of a factor and must be greater than its correlation with all other factors in the model. In other words, a latent construct should explain better the variance of its own indicators rather than the variance of other constructs (Hamid et al., 2017). In Table 5.17 below, the diagonal values in bold represent the square root of the AVE of the construct, whilst off-diagonal values represent interrelation among constructs. Table 5.17 shows that all diagonal variables are greater than off-diagonal values, confirming discriminant validity of the model.

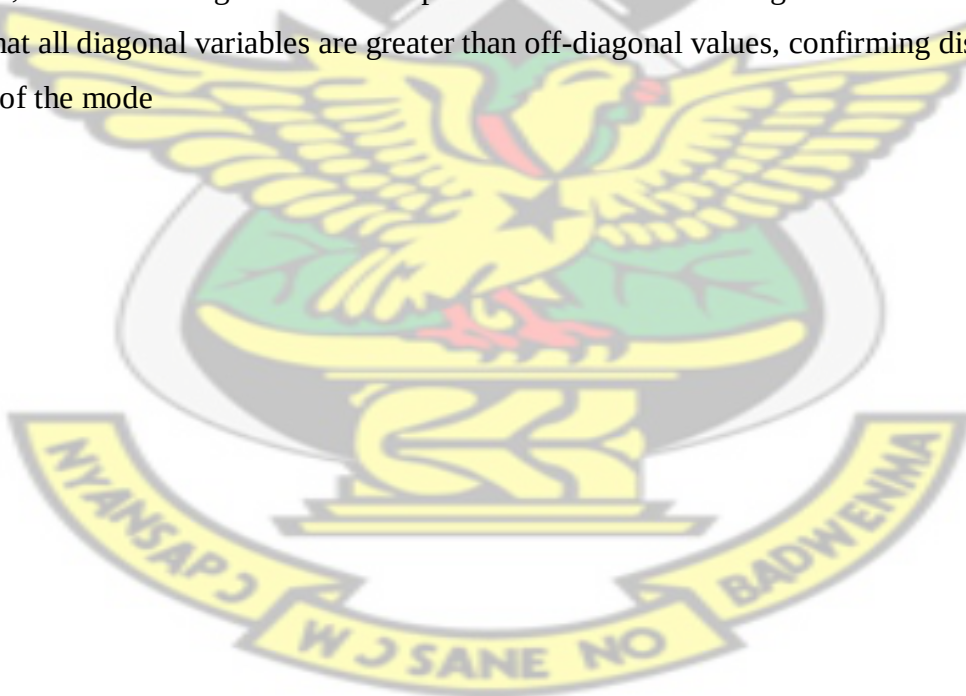


Table 5.17: Fornell Larcker criterion

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK	0.811														
CC	0.450	0.804													
CN	0.453	0.625	0.824												
COST	0.046	-0.049	0.018	0.838											
CP	0.296	0.361	0.317	0.095	0.806										
KS	0.416	0.558	0.531	-0.067	0.310	0.772									
MK	0.573	0.401	0.420	0.008	0.254	0.438	0.796								
MP	0.322	0.307	0.318	0.099	0.494	0.308	0.249	0.846							
NP	0.328	0.400	0.355	-0.008	0.264	0.453	0.320	0.349	0.806						
POTP	0.408	0.485	0.451	0.087	0.219	0.432	0.304	0.249	0.305	0.826					
PTP	0.367	0.395	0.378	0.073	0.290	0.286	0.207	0.221	0.192	0.530	0.879				
QUAL	0.068	0.031	0.057	0.461	-0.031	-0.101	0.037	-0.028	-0.048	0.113	0.119	0.917			
RBAS	0.396	0.452	0.408	0.119	0.277	0.356	0.339	0.280	0.362	0.587	0.552	0.183	0.719		
TP	0.475	0.480	0.392	0.130	0.257	0.406	0.376	0.239	0.331	0.621	0.620	0.187	0.616	0.817	
UK	0.405	0.367	0.373	0.000	0.151	0.344	0.520	0.197	0.293	0.237	0.197	-0.031	0.292	0.243	0.806

A new, more rigorous test of discriminant validity for PLS-SEM called the heterotrait-monotrait ratio of correlations (HTMT) test, has recently emerged. HTMT is a measure of the average of the heterotrait-heteromethod correlations (i.e., the correlations of indicators across constructs measuring different phenomena), relative to the average of the monotrait-heteromethod correlations (i.e., the correlations of indicators within the same construct) (Henseler et al. 2015). Henseler et al. (2015) suggest a threshold value of 0.90 if the path model includes constructs that are conceptually very similar. In other words, an HTMT value above 0.90 suggests a lack of discriminant validity. When the constructs in the path model are conceptually more distinct, a lower and thus more conservative threshold value of 0.85 seems warranted (Henseler et al. 2015). Table 5.18 indicates that the highest HTMT value is 0.807, confirming the model possesses adequate discriminant validity.



Table 5.18: HTMT results

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK															
CC	0.523														
CN	0.544	0.710													
COST	0.056	0.121	0.048												
CP	0.378	0.442	0.404	0.122											
KS	0.488	0.619	0.608	0.123	0.385										
MK	0.698	0.467	0.507	0.097	0.330	0.519									
MP	0.396	0.359	0.385	0.128	0.643	0.365	0.309								
NP	0.414	0.482	0.439	0.085	0.351	0.556	0.419	0.450							
POTP	0.514	0.580	0.560	0.131	0.294	0.521	0.387	0.315	0.394						
PTP	0.487	0.492	0.490	0.107	0.410	0.360	0.275	0.298	0.259	0.718					
QUAL	0.087	0.089	0.096	0.569	0.127	0.121	0.094	0.056	0.082	0.143	0.159				
RBAS	0.470	0.503	0.470	0.150	0.345	0.403	0.404	0.334	0.453	0.715	0.699	0.212			
TP	0.577	0.555	0.468	0.166	0.336	0.473	0.460	0.298	0.418	0.776	0.807	0.227	0.720		
UK	0.491	0.426	0.452	0.077	0.199	0.406	0.639	0.244	0.383	0.299	0.260	0.101	0.344	0.295	

Another approach which is popular in determining discriminant validity is the assessment of cross loadings, also called item-level discriminant validity. Finally, discriminant validity was assessed by observing item cross-loadings. There is discriminant validity when no research item loads higher on other constructs than their own constructs (Hair et al. 2014; Barclay et al. 1995). Otherwise the item in question is unable to discriminate whether it is part of the intended construct or another (Chin 2010). Table 5.19 shows that all measurement items loaded higher on their own constructs than against other constructs, confirming discriminant validity of the research model.



Table 5.19: Cross loadings

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK1	0.876	0.369	0.397	0.023	0.265	0.316	0.507	0.287	0.301	0.329	0.321	0.027	0.316	0.421	0.356
BK2	0.818	0.319	0.328	0.045	0.213	0.326	0.496	0.233	0.277	0.346	0.263	0.018	0.327	0.367	0.325
BK3	0.733	0.380	0.366	0.049	0.188	0.365	0.388	0.229	0.226	0.319	0.327	0.102	0.297	0.431	0.295
BK4	0.811	0.399	0.379	0.034	0.291	0.351	0.458	0.295	0.256	0.330	0.286	0.084	0.345	0.328	0.335
CC1	0.372	0.774	0.443	-0.005	0.212	0.329	0.273	0.271	0.293	0.323	0.278	0.063	0.348	0.328	0.286
CC2	0.397	0.834	0.541	0.014	0.322	0.448	0.333	0.265	0.330	0.390	0.340	0.108	0.365	0.399	0.224
CC3	0.370	0.798	0.570	-0.062	0.319	0.452	0.370	0.298	0.356	0.416	0.378	0.037	0.401	0.441	0.291
CC4	0.381	0.836	0.519	0.026	0.267	0.485	0.336	0.235	0.347	0.427	0.288	0.048	0.353	0.409	0.307
CC5	0.366	0.842	0.550	0.009	0.317	0.457	0.326	0.254	0.364	0.385	0.314	-0.004	0.381	0.371	0.345
CC6	0.291	0.778	0.438	-0.133	0.285	0.467	0.297	0.182	0.266	0.378	0.316	-0.041	0.339	0.394	0.352
CC7	0.356	0.763	0.445	-0.136	0.303	0.494	0.314	0.220	0.287	0.407	0.308	-0.042	0.355	0.355	0.263
CN1	0.392	0.453	0.801	-0.019	0.240	0.420	0.288	0.220	0.268	0.337	0.348	0.094	0.332	0.311	0.262
CN2	0.319	0.505	0.823	0.032	0.242	0.381	0.323	0.244	0.220	0.404	0.285	0.031	0.311	0.317	0.351
CN3	0.380	0.540	0.853	0.030	0.285	0.461	0.367	0.342	0.360	0.375	0.317	0.002	0.346	0.356	0.311
CN4	0.398	0.554	0.818	0.015	0.273	0.481	0.399	0.236	0.313	0.368	0.298	0.064	0.355	0.308	0.305
COMP1	0.212	0.308	0.334	0.167	0.212	0.217	0.204	0.297	0.284	0.460	0.448	0.190	0.751	0.475	0.196
COMP2	0.188	0.240	0.226	0.087	0.213	0.178	0.171	0.145	0.151	0.419	0.386	0.163	0.668	0.453	0.126
COST_1	0.012	-0.128	-0.022	0.789	0.057	-0.123	-0.057	0.098	-0.019	-0.016	-0.016	0.334	0.014	-0.006	-0.075
COST_2	0.029	-0.039	0.023	0.856	0.080	-0.046	-0.044	0.075	-0.073	0.114	0.124	0.431	0.102	0.129	0.024
COST_3	0.065	0.009	0.031	0.867	0.094	-0.026	0.093	0.083	0.061	0.093	0.052	0.385	0.152	0.163	0.024
CP1	0.248	0.325	0.266	0.060	0.826	0.306	0.227	0.406	0.276	0.159	0.205	-0.122	0.224	0.169	0.119
CP2	0.196	0.313	0.284	0.106	0.819	0.243	0.193	0.356	0.123	0.192	0.257	0.019	0.203	0.215	0.166
CP3	0.268	0.236	0.217	0.066	0.772	0.196	0.192	0.427	0.228	0.182	0.243	0.036	0.241	0.240	0.083
ENV	0.249	0.259	0.237	0.066	0.243	0.308	0.280	0.135	0.371	0.315	0.260	0.052	0.666	0.392	0.248
ET	0.292	0.370	0.338	0.151	0.204	0.324	0.273	0.154	0.280	0.445	0.354	0.117	0.786	0.470	0.242
KS1	0.321	0.404	0.468	0.055	0.206	0.801	0.384	0.248	0.348	0.347	0.249	-0.073	0.251	0.292	0.305

KS2	0.327	0.374	0.366	-0.093	0.224	0.744	0.353	0.209	0.318	0.254	0.232	-0.048	0.227	0.331	0.270
KS3	0.395	0.450	0.395	0.000	0.242	0.759	0.287	0.272	0.306	0.398	0.312	-0.046	0.315	0.413	0.214
KS4	0.293	0.468	0.397	-0.048	0.267	0.778	0.281	0.233	0.299	0.323	0.125	-0.100	0.247	0.218	0.189
KS5	0.360	0.508	0.529	-0.067	0.229	0.801	0.340	0.258	0.409	0.381	0.239	-0.048	0.350	0.401	0.260
KS6	0.311	0.393	0.351	-0.125	0.210	0.785	0.388	0.235	0.386	0.308	0.197	-0.116	0.254	0.265	0.292
KS7	0.233	0.413	0.343	-0.096	0.304	0.737	0.333	0.205	0.377	0.313	0.187	-0.122	0.270	0.265	0.334
MK1	0.494	0.358	0.374	0.008	0.219	0.374	0.783	0.261	0.262	0.266	0.205	0.039	0.300	0.339	0.397
MK2	0.437	0.305	0.306	0.012	0.214	0.340	0.836	0.182	0.251	0.199	0.088	-0.004	0.263	0.252	0.411
MK3	0.519	0.294	0.332	0.031	0.190	0.265	0.795	0.154	0.204	0.250	0.214	0.123	0.283	0.348	0.389
MK4	0.369	0.320	0.328	-0.025	0.187	0.420	0.770	0.194	0.305	0.255	0.152	-0.044	0.231	0.255	0.461
MP1	0.260	0.241	0.262	0.119	0.410	0.303	0.170	0.850	0.267	0.212	0.225	0.014	0.261	0.269	0.122
MP2	0.282	0.299	0.302	0.034	0.376	0.229	0.272	0.860	0.333	0.231	0.180	-0.029	0.301	0.186	0.217
MP3	0.276	0.238	0.243	0.100	0.468	0.250	0.188	0.828	0.286	0.189	0.156	-0.056	0.149	0.153	0.161
NP1	0.339	0.388	0.354	0.028	0.204	0.412	0.243	0.348	0.840	0.315	0.204	0.014	0.320	0.364	0.248
NP2	0.214	0.271	0.198	-0.066	0.069	0.326	0.275	0.238	0.795	0.145	0.082	-0.083	0.266	0.211	0.290
NP3	0.229	0.296	0.289	0.005	0.338	0.349	0.260	0.249	0.783	0.257	0.163	-0.057	0.285	0.213	0.181
POTP1	0.371	0.393	0.394	0.132	0.227	0.344	0.237	0.366	0.296	0.838	0.464	0.070	0.469	0.513	0.205
POTP2	0.278	0.357	0.338	-0.002	0.091	0.361	0.226	0.121	0.200	0.838	0.400	0.062	0.465	0.525	0.213
POTP5	0.360	0.453	0.385	0.086	0.225	0.366	0.292	0.126	0.260	0.803	0.451	0.149	0.523	0.502	0.169
PROF1	0.309	0.303	0.287	0.079	0.171	0.228	0.284	0.196	0.275	0.400	0.445	0.190	0.704	0.399	0.245
PROF2	0.420	0.372	0.340	0.020	0.216	0.348	0.362	0.309	0.292	0.455	0.397	0.063	0.649	0.464	0.252
PROF3	0.279	0.253	0.186	0.046	0.115	0.174	0.151	0.132	0.256	0.386	0.324	0.075	0.638	0.317	0.120
PTP3	0.277	0.364	0.346	0.039	0.200	0.264	0.171	0.129	0.148	0.505	0.890	0.065	0.464	0.567	0.148
PTP5	0.373	0.330	0.317	0.091	0.315	0.238	0.194	0.264	0.191	0.424	0.869	0.147	0.509	0.522	0.201
QUAL_1	0.064	-0.018	0.003	0.439	-0.050	-0.104	-0.003	-0.052	-0.036	0.072	0.102	0.915	0.159	0.140	-0.102
QUAL_2	0.062	0.073	0.100	0.407	-0.008	-0.082	0.071	-0.001	-0.051	0.134	0.115	0.920	0.176	0.203	0.044
TF1	0.295	0.399	0.313	0.088	0.205	0.264	0.239	0.215	0.243	0.433	0.420	0.165	0.804	0.486	0.216
TF2	0.340	0.404	0.359	0.045	0.216	0.266	0.240	0.224	0.216	0.483	0.519	0.143	0.784	0.512	0.243

TP1	0.422	0.390	0.360	0.052	0.183	0.360	0.340	0.168	0.322	0.571	0.546	0.175	0.553	0.883	0.235
TP2	0.408	0.377	0.268	0.113	0.181	0.240	0.272	0.133	0.217	0.508	0.546	0.106	0.413	0.804	0.139
TP3	0.349	0.385	0.338	0.133	0.219	0.364	0.271	0.233	0.220	0.483	0.473	0.182	0.502	0.837	0.170
TP4	0.370	0.424	0.313	0.135	0.266	0.367	0.348	0.258	0.325	0.461	0.457	0.147	0.548	0.736	0.251
UK1	0.277	0.244	0.281	0.000	0.125	0.264	0.449	0.139	0.223	0.164	0.100	-0.046	0.179	0.128	0.798
UK2	0.313	0.341	0.385	0.042	0.163	0.342	0.359	0.208	0.243	0.251	0.238	-0.042	0.277	0.248	0.783
UK3	0.368	0.340	0.280	-0.027	0.102	0.292	0.470	0.162	0.266	0.214	0.206	-0.050	0.264	0.244	0.856
UK4	0.343	0.258	0.263	-0.011	0.100	0.213	0.390	0.130	0.209	0.136	0.090	0.042	0.222	0.161	0.784



5.4.2 Test for multicollinearity

After examining the parameter estimates of the formatively-measured “Assimilation” construct using SmartPLS software, three outer weights were negative with six being positive. According to Hair et al. (2016), this may demonstrate a situation where high collinearity reverses the signs of the weaker indicator. This further drove the researcher to conduct a multicollinearity test using the Variance Inflation Factor (VIF).

The VIF was generated for the formative indicators of “Assimilation” construct using SmartPLS software. From Table 5.20, ASS8 has the highest VIF factor of (3.10). Hence, VIF values are uniformly below the recommended threshold value of 5 (Hair et al. 2016). The researcher therefore concludes that collinearity among the indicators has not reached critical levels for the formative construct and is not an issue for the estimation of the PLS path model.

Table 5.20: Results from Multicollinearity test

ASSIMILATION	
Indicators	VIF
ASS1	2.34
ASS2	1.91
ASS3	2.83
ASS4	2.96
ASS5	2.83
ASS6	2.58
ASS7	2.13
ASS8	3.10
ASS9	2.89

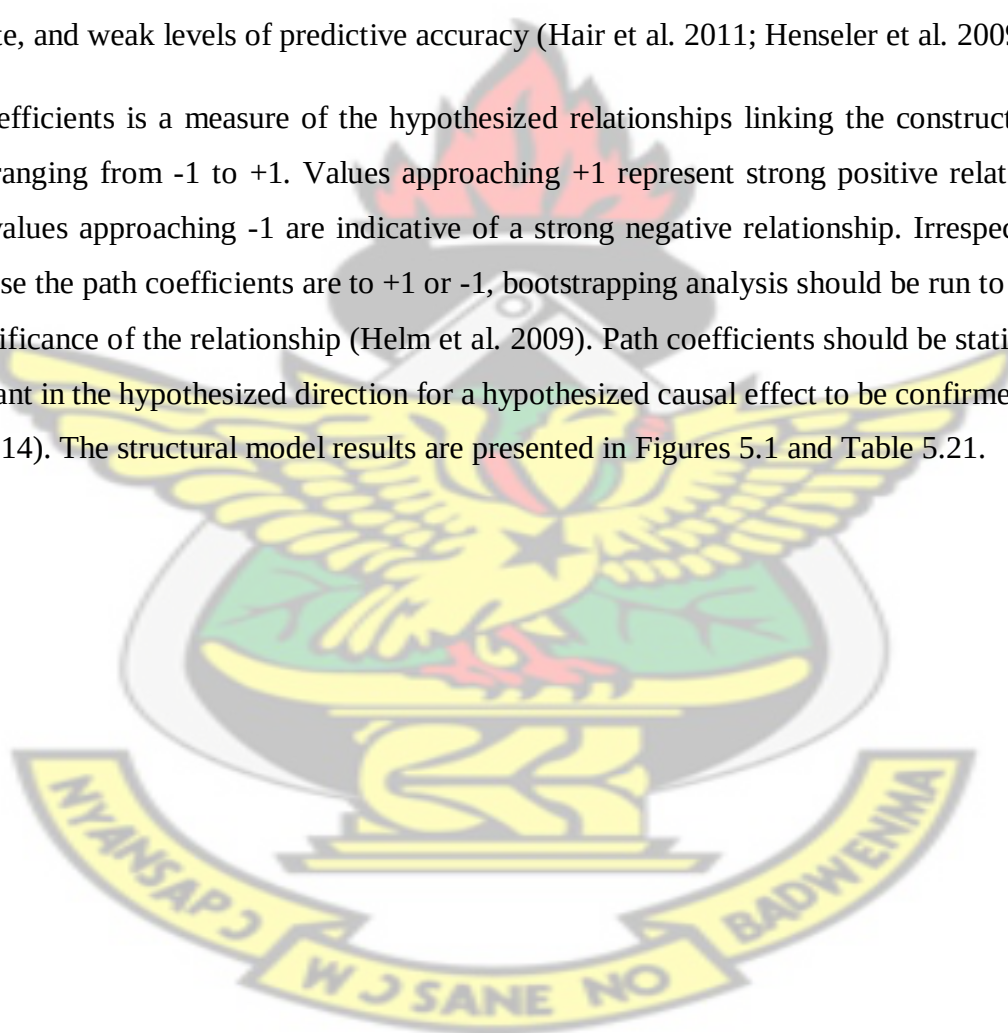
5.5 Structural Model Results

Having established the validity and reliability of the measurement model, the researcher proceeded to analyse the structural model. Structural model analysis in PLS-SEM is different from CB-SEM in that PLS-SEM focuses on using samples of the data to extract parameters which predict the dependent variable(s), whereas CB-SEM focuses on extracting parameters that minimize differences between observed covariance matrices and estimated covariance matrices.

PLS-SEM does not specify standard goodness-of-fit statistics as is the case with CB-SEM (Henseler and Sarstedt 2013), with model quality in PLS-SEM assessed based on the model's predictive abilities, measured through path coefficients, the coefficient of determination (R^2), and the effect size.

The Coefficient of determination (R^2) measures the predictive accuracy of the effect of the independent variable on the dependent variable. R^2 statistics are presented as values ranging from 0 to 1, with a higher R^2 depicting greater predictive accuracy (Hair et al. 2013). Given that R^2 has been adopted in diverse fields, there are no universally accepted criteria when it comes to an acceptable R^2 , with 0.75, 0.50, 0.25 respectively roughly indicating substantial, moderate, and weak levels of predictive accuracy (Hair et al. 2011; Henseler et al. 2009).

Path coefficients is a measure of the hypothesized relationships linking the constructs, with values ranging from -1 to +1. Values approaching +1 represent strong positive relationship whilst values approaching -1 are indicative of a strong negative relationship. Irrespective of how close the path coefficients are to +1 or -1, bootstrapping analysis should be run to test for the significance of the relationship (Helm et al. 2009). Path coefficients should be statistically significant in the hypothesized direction for a hypothesized causal effect to be confirmed (Hair et al. 2014). The structural model results are presented in Figures 5.1 and Table 5.21.



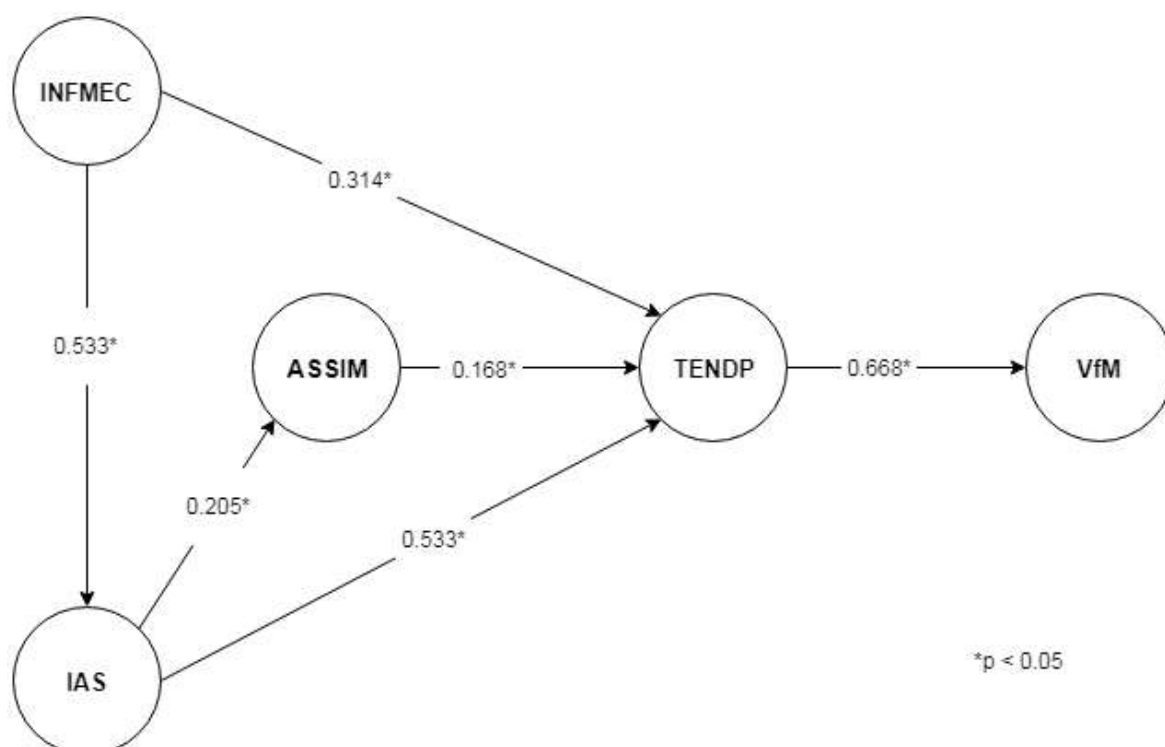


Figure 5.1 Structural model

The structural model revealed that the R^2 of Institutional Absorptive Capacity (IAS) was 30.6%, whilst the R^2 of Tendering Process (TENDP) and Value for Money (VfM) were 36.7% and 38.8% respectively. These represent moderate levels of variance explained for these constructs. The R^2 of E-procurement Assimilation on the other hand was 9.7%, which represents a weak level of variance explained. This suggests that beyond the organization's absorptive capacity and influence mechanisms, there could be other important drivers of the level of E-procurement Assimilation of the surveyed organisations.

Table 5.21: Hypotheses results

Relationships	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
ASSMIL -> TENDP	0.168	0.164	0.083	2.029	0.043
ASSMIL ->TENDP ->VFM	0.112	0.111	0.054	2.057	0.040
IAS -> ASSMIL	0.205	0.240	0.068	2.998	0.003
IAS -> TENDP	0.567	0.568	0.056	10.133	0.000
IAS -> TENDP -> VFM	0.379	0.381	0.048	7.817	0.000
INFMEC ->IAS→ ASSMIL	0.113	0.133	0.041	2.765	0.006
INFMEC -> IAS	0.553	0.554	0.045	12.193	0.000
INFMEC -> TENDP	0.376	0.380	0.048	7.838	0.000
INFMEC -> TENDP -> VFM	0.251	0.255	0.037	6.690	0.000
TENDP -> VFM	0.668	0.671	0.044	15.316	0.000

From Figures 5.1 and Table 5.21, it can be seen that all the hypothesized paths were supported. The influence of e-procurement assimilation on public procurement processes was positive and significant ($\beta = 0.168$; $t = 2.029$; $p < 0.05$). This suggests that the level of e-procurement assimilation influences the effectiveness of public procurement processes in the surveyed organisations. The public sector procurement process consists of a series of related (and sometimes unrelated) activities which is task-intensive in the sense that it involves many tasks and requires human effort to accomplish them. As a result the tendering process, in the end, becomes more complex and bureaucratic and takes much time to complete, and has become beset with corruption, nepotism, and human errors. All these render the process inefficient. The procurement process also requires large amount of information processing and communication (Gebauer, Beam and Segev 1998). In effect, the management and processing of procurement information is one of the most important tasks in public procurement and when poorly managed may lead to choice of wrong providers, which in turn lead to poor procurement outcome. Capacity building in information processing via electronic mode is crucial in processing procurement information with ease, at higher speed and accuracy. The results confirmed that high levels of e-procurement enabled the firms to become more effective and efficient in their procurement processes. Therefore, the introduction and application of e-procurement must be seen as an effort to modernize the procurement process to improve the efficiency and effectiveness (Rai et al. 2009). As Gebauer, Beam and Segev (1998) put it, e-procurement as an emerging technology in developing economies are reversing the time-consuming and inefficient procurement process. This is evidenced in this current study where about 39.4% of the success of the procurement process is explained by e-procurement assimilation in the public sector.

It was also revealed that institutional influence mechanisms had a positive and significant effect on institutional absorptive capacity ($\beta = 0.553$; $t = 12.193$; $p < 0.001$), suggesting that institutional influence mechanisms drive the absorptive capacities of firms. This confirms the findings of Bharati et al. (2013) that an organisation's absorptive capacity is influenced by institutional pressures. In addition, if institutional pressure's relationship with corporate environment practices is mediated by absorptive capacity, as argued by Shubham et al. (2018), then it can be concluded that institutional pressure has a direct effect on absorptive capacity as shown by this study. What this means is, an organisation's institutional influence mechanisms will empower it and its members to build capacity to embrace and practice e-procurement. In specific reference of coercive pressure, the policy of the sector ministry, directives of the

central procurement authority and from management of the procurement entity on issues such as the procurement automation could force the procurement entities to build capacity in areas such as information sharing, knowledge, and communication, which are prerequisites for automation of the procurement process. Besides, other external forces with direct stake in an emerging nation's development could also initiate projects and programmes in these countries which will compel them to build capacity through tooling and/or retooling, capacity building and training to improve the skillset of practitioners. Moreover, the best practices of other public sector entities could energize others to build capacity and mimic the activities of the successful organization.

The results of the analysis further revealed that institutional absorptive capacity had a positive and significant effect on the organization's public procurement processes ($\beta = 0.567$; $t = 10.133$; $p < 0.001$). This indicates that the institutional absorptive capacity of the organisations significantly shapes the effectiveness and efficiency of its public procurement activities. According to Paim et al. (2008), a certain level of absorptive capacity has to be attained to improve end-to-end processes. Processes such as the public procurement process is implemented by different people from different backgrounds who require an adequate level of absorptive capacity (Anton et al. 2014). This capacity is enhanced through establishing proper communication channels and requires the formation of cross-functional teams, information, experience and ideas sharing to better position the procurement process for success. The development of the necessary absorptive capacity by the actors in the public procurement function has therefore become inevitably significant to comply with procurement procedures. For instance, the competence and prior knowledge of managers, procurement officers and users with regards to procurement legal framework, policies and procedures place their institutions in a better place to practice more effective and efficient public procurement.

The findings also indicated that institutional absorptive capacity had a positive and significant effect on e-procurement assimilation ($\beta = 0.205$; $t = 2.998$; $p < 0.01$). This indicates that the institutional absorptive capacity of the organisations significantly influenced their level of e-procurement assimilation. Organisations build absorptive capacity and use acquired knowledge to take advantages of innovation (Addorisio et al. 2014). Absorptive capacity enables an organisation to obtain useful information and develop new capabilities for innovation (Ince et al. 2016). Through absorptive capacity, organisations build IT infrastructure useful for e-procurement assimilation. This suggests that the extent of e-procurement application usage in

an organization is dependent on the level of absorptive capacity. The higher the absorptive capacity of an organisation, the deeper the extent of assimilation. Therefore, this study's proposition that an institutional absorptive capacity significantly influence its e-procurement assimilation is confirmed by the result as indicated in figure 5.1, and table 5.20.

Finally, the public procurement processes had a positive and significant effect on value for money ($\beta = 0.668$; $t = 15.316$; $p < 0.001$), meaning organizations that are more efficient in following laid down public procurement procedures and processes were able to generate more value for money. As indicated in the structural model in figure 5.1, an effective, efficient and judicious adherence the tendering process in the public sector explains about 45% of value for money. As indicated earlier, the procurement function is not just an activity but series of related and sequential activities which include design and planning, sourcing, negotiation and contracting (Dimitri, 2013). The rest are contract management monitoring and evaluation. The strict compliance to process will create more value (Arlbjorn and Freytag, 2012), improve the quality of goods and services procured (Dimitri, 2013) coupled with practitioners upholding high principles of fairness and transparency, ethical and environmental standards, professionalism, being accountable for actions and inactions and finally making procurement more competitive (Manu, 2005; Raymond, 2008; Nsiah-Asare and Prempeh 2016; Raiser 2014).

5.6 Test of Mediation

In addition to these hypothesized direct paths, the results indicated the presence of two indirect effects (mediating effects) as hypothesized in the current study. These are 1) the mediating role of institutional absorptive capacity in the relationship between influence mechanisms and e-procurement assimilation and 2) the mediating effect of public procurement processes in the relationship between e-procurement assimilation and value for money.

The results suggest that the direct effect of influence mechanisms on e-procurement assimilation was not significant ($\beta = 0.062$; $t = 1.014$), implying that institutional pressures may not in itself cause public sector organizations to adopt and use electronic application in the procurement processes. This is contrary to the work of Liang et al. (2007), who concluded that there is direct effect of mimetic and normative pressures on IT assimilation and and Bala and Venkatesh (2007) who found a direct impact of all the three institutional pressures on IBPS. The finding however supports Bharati et al. (2013), whose study concluded that institutional

pressures have no direct effect on social media assimilation but rather impact absorptive capacity, which mediates its influence on assimilation. The difference in outcome could be attributed to the different industrial characteristics under study. While they used private sector organisations in advanced economies for their study, the current rather used public sector organisations in emerging economy. But it is also clear from the results that if the effect of influence mechanism on e-procurement assimilation is mediated through institutional absorptive capacity (IAS), the effect is not only positive but also significant ($\beta = 0.113$; $t = 2.765$; $p < 0.006$). This indicates that an organisation should use influence pressures they face to build and improve the absorptive capacity in order to acquire new knowledge, competence to assimilate e-procurement innovation. The result could also be attributed to the fact that, current public procurement laws have not made provisions that would compel actors to conform and comply to the use of e-mode. Therefore, public organisations may choose to do it or not. Even those which have adopted and assimilate aspects of the e-procurement tools are doing it on a 'pick and choose' basis, not in a structured manner.

Finally, public procurement processes mediated the effect of e-procurement assimilation on value for money ($\beta = 0.112$; $t = 2.057$; $p < 0.05$). The result also shows a significant mediating role of tendering process in the relationship between e-procurement assimilation and value for money (see figure 5.1 and table 5.21). The PPA bulletin (2010) argues that e-procurement has the potential for cost savings, reflected in the cost of transaction and value for money outcomes. According to De Boer et al. (2002), the increased use of e-procurement improves the efficiency and effectiveness of the procurement process which in turn leads to a better performance (VFM). What the result suggests is that the hypothesis that e-procurement leads to value for money only when it improves the efficiency and effectiveness of the tendering process is attested to by this study. The infusion and continuous use of e-procurement improves the governance structure of the public procurement system and operational efficiency. The more e-procurement system is assimilated in public sector, the more efficient and effective the procurement process and the better value for money outcome achieved.

5.7 Multi-Group Analysis (MGA) of industry effects

PLS-MGA was conducted in order to explore the results more in depth. It was assumed that the results of the drivers and effects of E-procurement assimilation may differ based on industry. In order to fully explore this assertion, PLS-MGA was conducted to examine the

antecedents and effects of E-procurement assimilation in different industries. Three industries with large enough samples were identified for the PLS-MGA, and these are (i) Classical organisations ($n = 87$), (ii) Project-based organisations ($n = 60$), and (iii) Local Government organisations ($n = 113$). Henseler (2012) has recommended examining both the measurement model results and the structural model results to more fully compare and identify differences between results of the different sub-groups.

5.7.1 PLS-MGA Measurement Model results

Following Henseler (2012) recommendations, the construct validity and reliability of the three models were examined. As can be seen from Table 5.22, whereas all constructs for the full data were valid and reliable, it was not same for the sub-groups. For classical organisations, Cronbach Alpha for PTP was 0.677, which was lesser than the recommended value of 0.7. For local government organisations, the Cronbach Alpha for NP was 0.656, which again fell short of the 0.7 benchmark. Finally, for Project based organisations, the AVE for RUBAED was 0.450, which fell short of the minimum 0.5 threshold (Hair et al. 2016). Discriminant validity for the sub-groups was tested and compared using the more rigorous HTMT test (Hair et al. 2017) and presented in Table 5.23, Table 5.24, and Table 5.25. Analysis of the HTMT revealed that HTMT values for local government model were all below the threshold of 0.9 as required. However, the project-based model had one HTMT value of 1.002 whereas classical organisations model had HTMT values of 1.000 and 1.008. The slightly worse measurement model results for the industry sub-groups could be attributable to the reduced sample size under each industry category relative to the full data. This also suggests that the full data fits the model better than each of the three sub-groups standing alone (Henseler 2012).

Table 5.22: Construct Validity and Reliability for Industry Sub-groups

Construct	All organisations (n =306)			Classical organisations (n = 87)			Local Government (n = 113)			Project Based organisation s (n = 60)		
	C.A	C.R.	AVE	C.A	C.R.	AVE	C.A	C.R.	AVE	C.A	C.R.	AVE
BK	0.825	0.884	0.658	0.864	0.908	0.713	0.812	0.877	0.640	0.805	0.874	0.635
CC	0.909	0.927	0.646	0.923	0.938	0.685	0.887	0.912	0.597	0.888	0.913	0.601
CN	0.842	0.894	0.679	0.893	0.926	0.759	0.791	0.865	0.616	0.771	0.853	0.596
COST	0.792	0.876	0.702	0.687	0.799	0.58	0.841	0.904	0.758	0.746	0.847	0.650
CP	0.730	0.847	0.649	0.776	0.87	0.691	0.799	0.881	0.712	0.568	0.772	0.545
KS	0.887	0.912	0.597	0.888	0.913	0.6	0.873	0.901	0.567	0.862	0.894	0.548
MK	0.807	0.874	0.634	0.758	0.847	0.581	0.780	0.859	0.604	0.845	0.896	0.683
MP	0.802	0.883	0.716	0.826	0.896	0.742	0.815	0.890	0.730	0.763	0.864	0.679
NP	0.732	0.848	0.650	0.744	0.841	0.643	0.656	0.812	0.592	0.765	0.864	0.680
POTP	0.768	0.866	0.683	0.798	0.881	0.713	0.717	0.841	0.638	0.746	0.855	0.663
PTP	0.707	0.872	0.773	0.677	0.823	0.608	0.713	0.841	0.640	0.700	0.835	0.630
QUAL	0.811	0.914	0.841	0.794	0.906	0.829	0.792	0.906	0.828	0.872	0.940	0.886
RBAS	0.882	0.905	0.517	0.912	0.928	0.589	0.888	0.909	0.528	0.838	0.876	0.450
TP	0.832	0.889	0.667	0.823	0.884	0.658	0.834	0.889	0.668	0.838	0.893	0.677
UK	0.819	0.881	0.649	0.802	0.871	0.629	0.840	0.893	0.676	0.811	0.877	0.641

Table 5.23: HTMT (Project Based Organisations)

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK															
CC	0.613														
CN	0.579	0.736													
COST	0.187	0.280	0.156												
CP	0.436	0.428	0.313	0.211											
KS	0.609	0.654	0.607	0.243	0.299										
MK	0.884	0.566	0.565	0.234	0.387	0.616									
MP	0.439	0.494	0.525	0.119	0.546	0.313	0.503								
NP	0.361	0.430	0.334	0.166	0.248	0.510	0.265	0.244							
POTP	0.536	0.681	0.581	0.328	0.318	0.497	0.512	0.317	0.370						
PTP	0.664	0.653	0.556	0.224	0.621	0.490	0.587	0.385	0.230	0.793					
QUAL	0.144	0.146	0.095	0.475	0.130	0.161	0.227	0.127	0.188	0.234	0.352				
RUBASED	0.474	0.676	0.541	0.316	0.403	0.434	0.401	0.231	0.281	0.748	0.873	0.462			
TP	0.620	0.587	0.417	0.251	0.332	0.509	0.593	0.193	0.324	0.638	1.002	0.455	0.745		
UK	0.841	0.469	0.613	0.195	0.295	0.547	0.717	0.439	0.282	0.401	0.555	0.191	0.344	0.379	

Table 5.24: HTMT (Local Government)

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK															
CC	0.568														
CN	0.562	0.654													
COST	0.075	0.119	0.096												
CP	0.481	0.647	0.572	0.255											
KS	0.440	0.546	0.446	0.139	0.566										
MK	0.734	0.420	0.425	0.106	0.381	0.505									
MP	0.429	0.561	0.430	0.164	0.674	0.546	0.275								
NP	0.383	0.567	0.483	0.144	0.409	0.553	0.405	0.514							
POTP	0.539	0.438	0.395	0.173	0.393	0.460	0.367	0.393	0.279						
PTP	0.572	0.456	0.537	0.209	0.488	0.471	0.367	0.410	0.422	0.582					
QUAL	0.105	0.150	0.129	0.615	0.158	0.159	0.116	0.118	0.194	0.213	0.137				
RUBASED	0.466	0.387	0.387	0.240	0.273	0.351	0.423	0.455	0.482	0.662	0.804	0.290			
TP	0.528	0.438	0.292	0.303	0.427	0.333	0.443	0.401	0.332	0.763	0.816	0.186	0.720		
UK	0.411	0.353	0.371	0.157	0.122	0.350	0.560	0.171	0.368	0.356	0.237	0.107	0.396	0.210	

Table 5.25: HTMT (Classical organisations)

	BK	CC	CN	COST	CP	KS	MK	MP	NP	POTP	PTP	QUAL	RBAS	TP	UK
BK															
CC	0.502														
CN	0.527	0.646													
COST	0.144	0.163	0.126												
CP	0.308	0.305	0.336	0.306											
KS	0.396	0.493	0.605	0.180	0.422										
MK	0.553	0.633	0.764	0.188	0.357	0.672									
MP	0.243	0.251	0.285	0.188	0.816	0.324	0.250								
NP	0.466	0.340	0.381	0.228	0.535	0.581	0.517	0.610							
POTP	0.565	0.543	0.553	0.188	0.299	0.557	0.447	0.386	0.518						
PRKN	0.872	0.688	0.753	0.204	0.370	0.638	1.008	0.284	0.616	0.563					
PTP	0.588	0.574	0.467	0.170	0.186	0.458	0.369	0.292	0.289	0.882					
QUAL	0.161	0.114	0.099	0.501	0.285	0.130	0.118	0.103	0.092	0.134	0.091				
RUBASED	0.527	0.543	0.455	0.155	0.370	0.509	0.441	0.401	0.511	0.875	0.815	0.134			
TP	0.674	0.527	0.536	0.149	0.342	0.569	0.479	0.403	0.455	0.835	1.000	0.281	0.771		
UK	0.368	0.556	0.556	0.170	0.245	0.494	0.725	0.207	0.533	0.376	0.346	0.132	0.396	0.415	

5.7.2 Structural Model results for sub-groups

Comparing the structural model results between the three sub-groups reveals some interesting insights. Parametric tests revealed that statistically significant differences were observed in the effect of influence mechanisms on institutional absorptive capacity when comparing classical organisations and local government organisations with $t = 2.071$. The result is expected in the sense that not all organisations are equally institutionalised. Even within the same organisation, the elements exhibit different habits (Zucker 1987). Therefore, these differences would eventually influence the extent to which various public sector organisations build absorptive capacity to acquire and assimilate new knowledge, information and competence. But irrespective of differences in institutional arrangement, differences in the effects of the hypotheses were not statistically significant across industry groups.

Overall, the full model data was superior to the three sub-group models with all hypothesized paths being significant. The classical organisations model had six hypothesized paths being significant, with the local government organisations model also having six hypothesized paths supported, whilst the project-based organisations had seven hypothesized paths being significant.

For project-based organisations, E-procurement assimilation is driven by institutional absorptive capacity, whereas this was not the case for classical organisations and local government organisations. Again, influence mechanisms were found to indirectly influence E-procurement assimilation through institutional absorptive capacity for project based organisations, but not for classical organisations and local government organisations. This suggests that institutional absorptive capacity and influence mechanisms enhance the level of E-procurement assimilation only for project-based organisation. The positive driving influence of institutional absorptive capacity and influence mechanisms on E-procurement observed in the full model was being driven by improvements recorded by project based organisations. This could be attributed to the fact that project-based organisations such as roads and highways, works and housing, the energy sector, railways and science and technology are high spent public organisations, whose projects are implemented by professionals with adequate technical knowledge and experience. Besides most of procurement activities are loan and donor funded where the funding agencies periodically organised training for such professionals in project implementation and management. Their rich prior competence is enough to acquire new skills

for e-procurement take off, unlike local government which until recently did not have a well-structured procurement system and would require a little more time to build competences.

There are interesting insights that can be observed with regards to the drivers of public procurement processes. The influence of institutional absorptive capacity on public procurement processes was positive and significant regardless of the industry. Institutional absorptive capacity as well mediated the effect of influence mechanisms on public procurement processes in the full model and all three sub-group models. This indicates that IAS enhances public procurement processes across all industries, and as such all industries stand to benefit from higher institutional absorptive capacity.

It was also observed that influence mechanisms had a positive and significant effect on public procurement processes in the full model, but this was not observed in any of the three industry sub-groups studied in this study. Further, E-procurement assimilation had a positive effect on public procurement processes in the full model, that did not reflect in all three sub-groups. This could be due to the relatively lower sample size of the industry sub-groups. This could also be attributable to e-procurement assimilation and influence mechanism driving public procurement processes in the other 47 organisations that did not fall under classical, project-based or local government industry categories.

Finally, with regards to the drivers of value for money, E-procurement assimilation enhanced value for money through public procurement processes for the full model, but this was not observed for the three sub-models. Again, this may be attributable to large sample size for the full model, or “other” organizations contributing significantly to the effect. The direct effect of public procurement processes on value for money was however confirmed in all three sub-groups, meaning regardless of industry, higher public procurement processes will result in higher value for money. The results of the comparison of the structural model results of the full model and the three major industry sub-groups has been summarized in Table 4.26.

Table 5.26: Industry group results (PLS-MGA results)

	All organisations n =307	Classical n =87	Local Govt n= 113	Project Based n=60	Parametric Tests		
	Path (T-value)	Path (T-value)	Path (T-value)	Path (T-value)	Classical Vs Local Govt	Classical vs Project Base	Local Govt Vs Project Based
ASSMIL -> TENDP	0.168 (2.029)*	0.198 (1.203)	0.352 (1.443)	0.194 (1.305)	0.154 (0.475)	0.004 (0.018)	0.158 (0.439)
ASSMIL -> TENDP ->VFM	0.112 (2.057)*	0.144 (1.368)	0.237 (1.420)	0.143 (1.298)	0.093 (0.424)	0.001 (0.004)	0.094 (0.376)
IAS -> ASSMIL	0.205 (2.998)*	0.309 (1.590)	0.323 (1.463)	0.415 (5.080)*	0.014 (0.044)	0.106 (0.398)	0.092 (0.297)
IAS -> TENDP	0.567 (10.133)*	0.571 (5.699)*	0.527 (4.334)*	0.670 (5.376)*	0.052 (0.789)	0.019 (0.236)	0.033 (0.380)
IAS -> VFM	0.379 (7.817)*	0.416 (4.061)*	0.356 (3.978)*	0.497 (4.224)*	0.060 (0.465)	0.081 (0.526)	0.142 (1.001)
INFMEC -> ASSMIL	0.113 (2.765)*	0.138 (1.468)	0.222 (1.412)	0.241 (3.416)*	0.085 (0.429)	0.103 (0.734)	0.019 (0.669)
INFMEC -> IAS	0.553 (12.193)*	0.445 (5.025)*	0.688 (10.054)*	0.581 (5.773)*	0.243 (2.071)**	0.136 (0.902)	0.107 (0.819)
INFMEC ->TENDP	0.251 (6.690)*	0.094 (1.124)	0.032 (0.262)	-0.004 (0.028)	0.062 (0.398)	0.098 (0.634)	0.036 (0.183)
INFMEC -> TENDP	0.314 (7.165)*	0.348 (3.737)*	0.395 (4.277)*	0.385 (3.420)*	0.109	0.135	0.027
INFMEC -> VFM	0.251 (6.690)*	0.254 (3.222)*	0.266 (3.904)*	0.286 (3.184)*	0.012 (0.119)	0.032 (0.268)	0.020 (0.172)
TENDP -> VFM	0.668 (15.316)*	0.728 (5.738)*	0.674 (13.072)*	0.742 (10.188)*	0.054 (0.446)	0.014 (0.087)	0.067 (0.756)

* p < 0.05

5.8 Chapter Summary

In this chapter, the data collected were duly presented, analysed and discussed accordingly. It first presented and analysed the demographics and the descriptive statistics. Significant among them is the analysis of the extent of electronic procurement assimilation. PLS-SEM techniques were also employed to analyse the measurement model and the structural model and to test for the industry effects. The findings were duly discussed. The summary of all the major findings are presented in chapter six



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This study was undertaken to address four major issues in public procurement in emerging economies. The first is to design a comprehensive instrument for measuring value for money in public procurement. The second is to understand the extent of IT application in public sector procurement. The study also set out to explore the antecedents and outcomes of e-procurement assimilation in an emerging economy. Lastly, the study set out to find whether industry effect would play any role in e-procurement assimilation leading to value for money. This chapter is organized and presented as follows: presentation of major findings, conclusion based on results, practical and theoretical implications of the findings, and lastly areas for further inquiry.

6.2 Summary of Findings

This section is presented in line with the four key thematic issues informing this study, these are value for money instrument development, e-procurement assimilation in the public procurement process, the antecedents and outcomes of e-procurement assimilation, and the industry effects.

6.2.1 Measuring Value for Money

Owing to the lack of a comprehensive measure of value for money in public procurement in the emerging economies, this study, after review of extant literature of value for money in public sector procurement identified and classified all dimensions of value for money as economic, comprising of whole-life (efficiency) cost and quality (effectiveness) and rule-based consisting of competitiveness, transparency and fairness, accountability, ethics, environmental concerns and professionalism. Two levels of analysis were performed. First PSA and CSV techniques were used to reduce the number of measurement items covering all the dimensions from 25 to 18. The second level focuses on the value for money dimensions. An initial instrument was designed with 10 dimensions of value for money, which were later reduced to 7, eliminating efficiency, effectiveness and accountability, as represented in Appendix A. This is due to fact that they are better represented by other dimensions as perceived by the respondents.

6.2.2 Antecedents and Outcome of E-procurement assimilation

Institutional pressures have been found to influence on IT adoption, use and assimilation as evidenced by the works of Sherer et al. (2016), Liang et al. (2007) and Bala and Vanketesh (2007). Absorptive capacity on the other hand, is also found to have substantial effect on e-procurement adoption and assimilation. Rai et al. (2006) posit that the level of IT sophistication and e-procurement innovation infrastructure influence e-procurement innovation assimilation as Vaidya et al. (2005) found an organisation's readiness in terms of e-business capabilities as antecedents of e-procurement assimilation. The findings of this study also establish a positive relationship between absorptive capacity and influence mechanisms as antecedents of e-procurement assimilation and tendering process. It was revealed that influence mechanisms have a direct positive and significant effect on absorptive capacity as was found in the study of Bharati et al. (2013). This suggests that an organisation's influence mechanisms will empower it and its members to build capacity for practice and to embrace e-procurement assimilation.

The current study indicates that the absorptive capacity of the public sector organisations significantly influence e-procurement assimilation. This suggests that the extent of e-procurement application usage in an organization is dependent on the level of absorptive capacity. Therefore, the higher the absorptive capacity of an organisation, the deeper the extent of e-procurement assimilation will be. On the contrary, the findings of this study suggest that there is no such direct effect of influence mechanisms on e-procurement assimilation in public sector organisations, implying that institutional pressure may not in itself cause public sector organizations to adopt and use electronic application in the procurement process, let alone to talk of its assimilation.

On the issue of absorptive capacity's influence on the procurement process, the findings indicate that the institutional absorptive capacity of the organisation significantly influences the procurement process, and this indicates that a certain amount of absorptive capacity level has to be attained to achieve effective and efficient end-to-end procurement processes. This could be achieved through establishing proper communication channels and requires the formation of cross-functional teams, information, experience and ideas sharing to better position the procurement process for success. Influence mechanism's effect on the procurement process revealed a positive and significant direct effect. This is expected in the sense that public procurement is practiced via a law, which specifies the regulations, methods

and procedures to follow. Therefore, the strict compliance of provisions in the law will significantly improve process efficiency.

The findings also show a direct positive and significant influence of e-procurement assimilation on the procurement process. The procurement process also requires large amount of information processing and communication (Gebauer et al., 1998) and capacity building in information processing via e-procurement is crucial in processing procurement information with ease, at higher speed and accuracy. Therefore, the introduction and application of e-procurement must be seen as an effort to modernize the procurement process to improve the efficiency and effectiveness (Rai et al, 2009). Lastly, the study found that procurement processes had a significant influence on achieving value for money in public procurement. This is so because the strict compliance to process will create more value (Arlbjorn and Freytag, 2012), and improve the quality of goods and services procured (Dimitri, 2013)

6.2.3 Test of mediation

This study hypothesized two indirect relationships – 1) the mediating of effect of institutional absorptive capacity in the relationship between influence mechanisms and e-procurement assimilation and 2) the mediating effect of the tendering process in the relationship between e-procurement assimilation and value for money. On the issue of the mediating role of absorptive capacity in the relationship between influence mechanisms and e-procurement assimilation, the findings indicate a positive and significant effect, implying that institutional pressures may not in themselves cause public sector organizations to adopt and use electronic application in the procurement process, let alone talk of assimilation contrary to the work of Liang et al (2007) and Bala and Vanketesh (2007). Firms however may use its influence pressures to build and improve the absorptive capacity in order to acquire new knowledge and competence to assimilate e-procurement innovation. Similarly, there is a significant mediating role of public procurement processes in the relationship between e-procurement assimilation and value for money. As De Boer et al. (2002) put it, the increased use of e-procurement improves the efficiency and effectiveness of the procurement process which in turn leads to a better performance (VFM). Therefore, the more e-procurement is assimilated in public sector, the more efficient and effective the procurement process and the better value for money outcome achieved.

6.2.4 Industry effects

Public sector organisations are many and exhibit different characteristics. The uniqueness of these organisations makes their response to both internal and external stimuli different. Though all public sector organisations are expected to use the same policies, methods and procedures in their procurement functions, there are slight differences as a result of background and the level of spend. As a result, this study collected data from 13 major industries in the public sector, which are categorized into 4 major groupings based on similarity in practice and function. These are local government, state-owned enterprises, project-based organisations and classical organisations. A Multi-Group Analysis of industry effects was conducted with the assumption that the results of the drivers and effects of E-procurement assimilation and public procurement processes may differ based on the industry. For lack sufficient sampling data, state-owned enterprises group was dropped, leaving the other 3 to compete. But irrespective of differences in institutional arrangement, differences in the effects of the hypotheses were not statistically significant across industry groups, except project-based organisations. This could be attributed to the fact that project-based organisations such as roads and highways, works and housing, the energy sector, railways and science and technology are high spent public organisations, whose projects are implemented by professionals with adequate technical knowledge and experience. Besides most of procurement activities are loan and donor funded where the funding agencies periodically organised training for such professionals in project implementation and management. Their rich prior competence is enough to acquire new skills for e-procurement take off, unlike local government which until recently did not have a well-structured procurement system and would require a little more time to build competences.

6.3 Implication of the study

6.3.1 Research Implication

Though there are quite many literatures on value for money in procurement, just a few has really empirically measured it, of which majority are on Public-private partnership initiatives and Private financed initiatives studies. Up till now, there has been no standard empirical measurement of value for money in public procurement. This study has, not only developed a comprehensive measure for value for money, but has tested the instrument empirically in the public sector of an emerging economy. .

In addition, absorptive capacity has long been identified as an antecedent of e-procurement adoption and assimilation in the advanced economies with little or no emphasis on developing economies, specifically the public sector. The current study has confirmed that irrespective of the economic and industrial background, absorptive capacity will continue to drive the adoption and assimilation of e-procurement.

The study also indicated that institutional pressures, which have been identified and used as a driver of IT adoption and application in the procurement process, did not have a direct effect on e-procurement assimilation in the public sector in the developing economies but rather have to be used to build the absorptive capacity of public sector organisations. This implies that in the public sector procurement, institutional pressures' effect of e-procurement assimilation has to be mediated by absorptive capacity of the respective organisations.

Furthermore, according to Rai et al. (2009), e-procurement has a direct effect on procurement productivity. On the contrary, this study reveals an indirect effect of e-procurement on value for money. The reason is e-procurement assimilation ought to improve the efficiency and effectiveness of the procurement process before achieving the desired value for money outcome in the public sector.

Finally, though assimilation of electronic applications in the procurement process helps to process information quicker to improve turnaround time to increase efficiency of the procurement system to realize value for money, the effective management of the influence mechanisms (institutional pressures) and the appropriate utilization of institutional absorptive capacity can achieve the same results.

6.3.2 Practical Implication

The findings show that institutional pressures have no significant direct effect on e-procurement assimilation. This finding is expected because there is little or no legal obligation on the part of procurement entities to use the electronic means for all or a section of the procurement process. Providing e-procurement in the public sector a legal framework could compel the actors to comply.

More so, the findings indicate that public entities as a matter of necessity should build the absorptive capacity of their procurement actors, in such areas as competence in the use of

electronic tools and of the procurement practice and also information sharing through effective communication networks. These are necessary tools needed to scan, identify and assimilate new information necessary for e-procurement use and efficient procurement process.

It also behoves the government, the regulator (that is Public Procurement Authority) and heads of procurement entities to effectively utilize and enforce the procurement regulations to build the absorptive capacity of the institutions mandated to implement the e-procurement platform. This is necessary because the study finds that it is the only way for now, that institutional pressures could have a positive influence on e-procurement assimilation.

Finally, e-procurement assimilation, in itself, may not lead to value for money, as indicated in this study but would lead to improved public procurement processes, which in turn would provide the desired value for money outcome. The significance of the electronic mode in this context is to facilitate and fast track the procurement information processing, reducing human errors, inculcating transparency and fairness in the bidding process. This will go a long way to enhance the confidence of tenderers in public procurement and also enable them to effectively respond to forces in the global sourcing marketplace.

6.4 Limitations and Suggestions for Further Research

A limitation of this study is measuring value for money only from the perspective of the procuring entity. E-procurement in the public sector of Ghana is at the infantile stage and is yet to include other key stakeholders like suppliers and contractors in the procurement. Therefore, the views of suppliers and contractors were not sought for this study, though their perception of total cost, quality and the public procurement system is might be different from the public procuring entities. In addition, real data of cost, quality and other procurement data over the years were not available and as such the study had to rely on responses from key respondents. It is suggested that future research could focus on real transactional level data of organisations.

Again, the industry effect (control variable), did not record a more significant results among the comparing industries. This could be attributed to the seemingly small sample size of the subgroups, even to the extent that state-owned enterprises as a subgroup was dropped. With the same purpose and intent, further study could be conducted on parallel bases, with specific focus on each industry. This will afford a proper comparison.

Another significant limitation of the current study is to the effect that the value for money conceptualization was based on goal-setting theory, which establishes stakeholders' satisfaction by gauging the disparity between the *ex-ante* goals and the *ex-post* performance. This study was focused on *ex-ante* performance of the procurement process and not the *ex-post*. Therefore, it is suggested future research could measure *ex-post* value for money

Lastly, the value for money instrument developed by this study could also be used by both developed and developing economies for measure *ex-ante* value for money to aid proper comparison and generalization.



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APPENDIX A

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY. KUMASI

QUESTIONNAIRE

This questionnaire is to solicit information on the topic **“Influence Mechanisms and Institutional Absorptive Capacity, E-Procurement Assimilation and Value for Money in Public Procurement”** towards a PhD at the Department of Supply Chain and Information Systems, and you have been chosen as a participant in this study. Your willingness to participate in this study is much appreciated. From your personal experience and the knowledge of your organization’s procurement activities, kindly provide responses that represent the reality concerning issues being studied in this research. Your responses will remain highly confidential. Thank you

SECTION A

Kindly indicate the extent to which you agree or disagree to each of the following statements regarding your organization’s absorptive capacity in E-procurement assimilation using a scale of 1 – 5[where1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree and 5=strongly agree]

	Prior Knowledge	1	2	3	4	5
BK1	The general knowledge level of our procurement staff is high					
BK2	The overall technical knowledge of our procurement staff is high					
BK3	The general educational level of our procurement staff is high					
BK4	The overall job competence of our procurement staff is high					
MK1	The knowledge of our managers is adequate when making procurement decisions					
MK2	The knowledge of our managers is adequate when dealing with new technologies					
MK3	The knowledge of our managers is adequate when managing daily operations					

MK4	The knowledge of our managers is adequate when solving technical problems in relation to IT and procurement function					
UK1	The general business knowledge of our end-users is high					
UK2	The technical knowledge of our end-users in their line of duty is high					
UK3	The knowledge of our end-users in the procurement function is high					
UK4	The knowledge and competence of our end-users in IT application is high					
	Communication network	1	2	3	4	5
CN1	The communications between supervisors and their subordinates are extensive					
CN2	The communication among functional areas are extensive					
CN4	The communication among functional areas are frequent					
CN5	The communication between supervisors and their subordinates are frequent					
CN6	The communication of new ideas from one department to another is extensive					
	Communication climate	1	2	3	4	5
CC1	Our employees tend to trust each other					
CC2	Our employees are supportive of each other					
CC3	Our employees have strong feelings of belonging to our organization					
CC4	Our employees share ideas freely with each other					
CC5	Our employees have no difficulty accepting new ideas					
CC6	Our employees are willing to accept changes					
	Knowledge scanning	1	2	3	4	5
KS1	We seek to learn from tracking new operational trends in our industry					
KS2	We seek to learn from routine search of useful information regarding the supply market					
KS3	We seek to learn from benchmarking best practices in our industry					
KS4	We seek to learn from trying out new technologies					
KS5	We seek to learn from our clients and suppliers					
KS6	We seek to learn from taking new business opportunities					
KS7	We seek to partner research institutions to learn new knowledge					

SECTION B

Kindly indicate the extent to which you agree or disagree to each of the following statements regarding the influence forces in E-procurement assimilation using a scale of 1 – 5[where 1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree and 5=strongly agree]

	Coercive pressure	1	2	3	4	5
CP1	The sector ministry requires us to automate our procurement activities					
CP2	the public procurement authority requires us to automate all or some aspects of the procurement function					
CP3	The trends in doing business today require us to automate our operations					
CP4	Some of our suppliers have already automated their systems					
	Mimetic Pressure	1	2	3	4	5
MP1	Other public entities which have adopted IT in their procurement have greatly benefited					
MP2	Other public entities which have adopted IT in their procurement are favorably perceived by suppliers and clients					
MP3	Other public entities which have adopted IT in their procurement are favorably perceived by the regulator (PPA)					

Please, use a scale of 1 – 5[where 1=very low; 2=low; 3=moderate; 4=high and 5=very high] for the table below.

	Normative Pressure <i>Please indicate</i>	1	2	3	4	5
NP1	The extent to which your organization shares the same vision with suppliers and other organizations in the same industry					
NP2	The extent to which your suppliers and clients use IT in their operations					
NP3	The extent to which the government's promotion of IT influences your organization to use automation in your procurement activities					

SECTION C

The table below shows the stages at which your organization uses electronic procurement (**horizontal**) for each of the steps in the procurement process (**vertical**). For each of the stages of procurement, select the most appropriate stage of use of electronic procurement by marking (X) in the box corresponding to the appropriate step in the procurement process. Tick as many as applicable in your organization. (hint: take one stage of assimilation, finish before moving to the next).

Stage in E-procurement assimilation Steps in the Procurement process	<u>Awareness</u> We are familiar with information technology tools that are used in.....	<u>Interest</u> We are interested in using IT tools inin the shortest possible time	<u>Evaluation/trial</u> We have acquired an IT application to aid and is even under trial to evaluate its usefulness	<u>Commitment</u> The IT application usage for procurement activities is already planned, in progress and/or implementation in	<u>Limited deployment</u> In this organization, about 25% of the procurement activities has been automated in.....	<u>General deployment</u> In this organization, more that 50% of the procurement activities has been automated in.....
Procurement needs assessment						
Procurement Planning and budgeting						
Specifying requirements and requisition						
Choosing the procurement procedure						

Requesting quotation/proposal and inviting bids						
Evaluating bids						
Purchase Order placement						
Award and notification of contract award						
Monitoring/follow-up/expediting of contract						
Payment						

SECTION D

Kindly indicate the extent to which you agree or disagree to each of the following statements regarding measures of value for money of your organisation's procurement function using a scale of 1 – 5 [where 1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree and 5=strongly agree]

	Economic dimension	1	2	3	4	5
COST1	The price of a purchase/contract is the only determinant of total cost (reverse coding)					
COST2	The cost of installation/warranty, training and other ancillary costs are not considered as part of total cost of a contract or purchase order (reverse coding)					
COST3	The cost of running or operating e.g. maintenance, repairs etc. are not considered when determining total cost of a contract or purchase order (reverse coding)					
COST4	The duration of contract execution, order or service delivery influences pricing					
COST5	Final cost of project is always higher than planned/ budgeted					
QUAL1	End users' requirements are largely missed at all times (reverse coding)					

QUAL2	End users always complaint that the procured products/projects/services do not fit the purpose of their acquisition (reverse coding)					
QUAL3	Monitoring and evaluation rarely influence procurement cost and quality (reverse coding)					
QUAL4	The user rate of procured products/projects/services is satisfactory					
	Rule-based dimension	1	2	3	4	5
COMP1	Most of our procurement activities are carried in a competitive manner					
COMP2	Greater supplier/contractor/service provider participation in our bidding process					
TF1	An equal playing field is offered to all potential vendors, in all stages of the procurement process					
TF2	Our procurement activities are accessible to all those who meet the eligibility criteria					
ET	Ethical issues are always considered at all stages in the procurement function					
ENV	Environmental issues are always considered at all stages in the procurement function					
PROF1	We make sure that only qualified and experienced officers are engaged in our procurement activities.					
PROF2	There is a capacity building and training for staff in procurement which ensures new ways and best practices in the procurement function					
PROF3	We are held responsible for their roles in all aspects of the procurement process					

SECTION E

Kindly indicate the extent to which you agree or disagree to each of the following statements regarding the activities in the tendering process 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]

	Pre-tendering phase	1	2	3	4	5
PTP1	We conduct needs analysis to assess the relevance of each procurement request					
PTP2	We largely handle all procurement activities as captured in our annual procurement plan					
PTP3	Procurement requirements and statement of works are specified way before tendering					
PTP4	Procurement requirements and statement of works are specified not only in technical terms but functional and performance terms as well					
PTP5	We choose the most appropriate procurement methods and procedures before actual tendering begins					
PTP6	Pre-tendering meetings are always held in high-value and critical procurement activities with prospective suppliers					
	Tendering phase	1	2	3	4	5
TP1	Procurement activities are communicated to prospective suppliers early enough using the appropriate media as prescribed by law					
TP2	We use appropriate supplier information solicitation tools (e.g. RFQ, RFP, ITT, etc.) for all the our procurement activities					
TP3	We always evaluate bids/tenders to identify tenderers who have technical, legal, financial and managerial capacities to perform the intended contract.					
TP4	We sometimes conduct post-qualification assessment to ascertain the authenticity of documents presented.					
TP5	We negotiate with pre-qualified tenderers to agree on terms prior to award of contract					
TP6	We issue an award of contract to notify successful bidder/bidders and demand payment of performance security within the period of validity					
	Post-tendering phase	1	2	3	4	5
PoTP1	For high profile procurement, a contract management team is formed to monitor the activities of contractors from time to time					

PoTP2	We have dedicated staff who follow up on orders to ensure quality and timely delivery					
PoTP3	We make sure that any variations to original contract are estimated way before the start of any procurement activity and captured in the contract					
PoTP4	payment of orders/contracts are made judiciously as pertained to the contract and avoid overruns					
PoTP5	For high profile works procurement, contractors are asked to observe the period of liability before final payment is made to them.					

SECTION F: Demographics

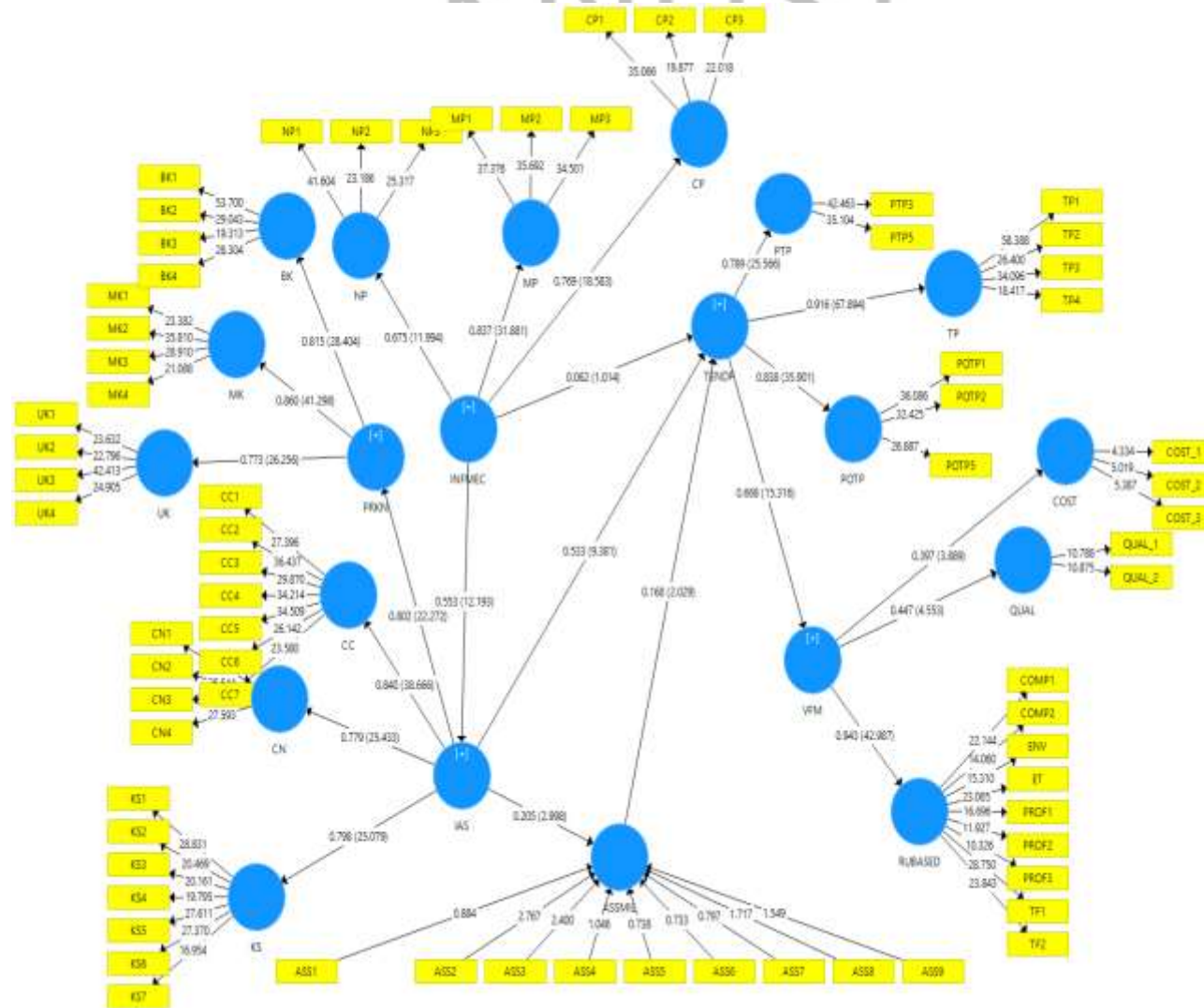
(Please tick (X) where appropriate)

Gender	Tick
Male	
Female	
Age	Tick
Less than 30 years	
31 – 40 years	
41 – 50 years	
More than 50 years	
Number of years spent with this entity	Tick
Less than 5 years	
6 – 10 years	
11 – 15 years	
16 – 20 years	
More than 20 years	
Level of Education	Tick
Secondary	
First Degree	
Second Degree	

Professional	
Industry	Tick
Education	
Health	
Agriculture	
Road and Transport	
Works and Housing	
Forestry and natural resources	
Science, Technology and Research	
State- own Enterprise	
Utility	
Banking and finance and insurance	
Security service	
Judiciary	
Other, specify.....	
Role Description	
Chief Executive Officer	
Chief Director	
Director/ Deputy Director	
Finance Officer/Deputy Finance	
Accountant	
Procurement Director /officer/Deputy	
Head of Stores	
Head of User department	
Head, operations	
Other, please specify,	



APPENDIX C STRUCTURAL MODEL T-VALUES

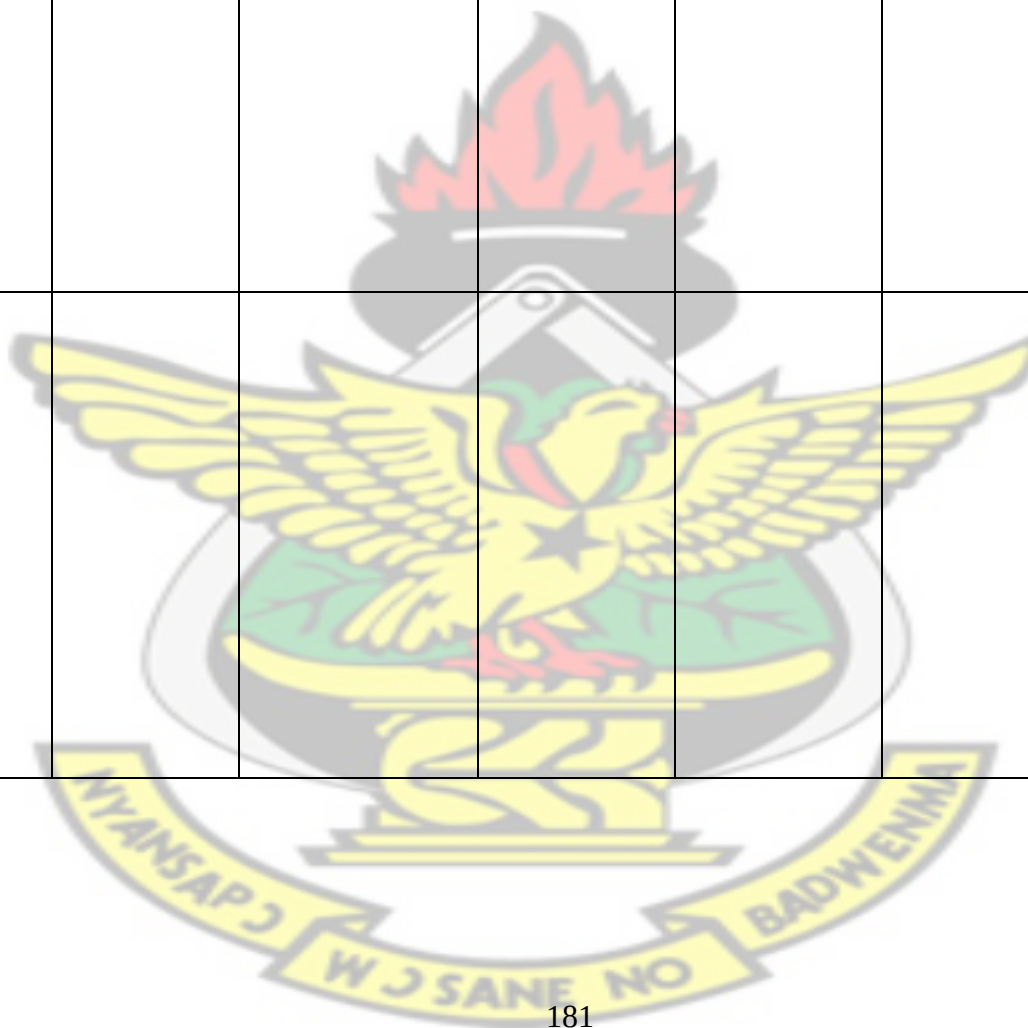


APPENDIX D

Item Rating Task to Assess Content Adequacy (a sample)

	Quality	Cost	Efficiency	Effectiveness	Competitiveness	Fairness & Transparency	Accountability	Ethical concerns	Environmental concerns	Professionalism
	<i>Represents Meeting requirements, Fitness for purpose with Less variance</i>	<i>The total cost of acquisition, operations and disposition</i>	<i>Minimizing resources used in the procurement function and still yielding the same or a better outcome</i> <i>measures the unit cost of output required, work measurement and cycle time of project execution</i>	<i>Extent to which outputs achieve the desired outcomes and also a customer satisfaction.</i>	<i>Broadening the scope of tendering to as many potential suppliers as possible</i>	<i>The same rule applying irrespective of diversity and openness</i>	<i>Responsible and accountable for procurement decisions</i>	<i>Adherence to standards and codes in the procurement process</i>	<i>Adherence to procurement standards pertaining to the environment</i>	<i>The extent to which education and experience are applied in making decision regarding the procurement function</i>
The price of a purchase/contract is the only										

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determinant of total cost									
The cost of tendering is not considered when determining the total cost of a contract/order									
The cost of installation/warranty, training and other ancillary costs are not considered as part of total cost of a contract or purchase order									

APPENDIX E
Data Array for Content Adequacy Scores

VFM Sub-construct	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	# 14	# 15	# 16	# 17	# 18	# 19	# 20	# 21	# 22	# 23	# 24	# 25
Quality																									
Cost																									
Efficiency																									
Effectiveness																									
Competitiveness																									
Transparency																									
Fairness																									
Accountability																									
Ethical &																									
Environmental issues																									
Professionalism																									

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