ELECTRONIC -PROCUREMENT IMPLEMENTATION MODELFOR PUBLIC SECTOR CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

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ABSTRACT

Procurement accounts for a large percentage of Nigerian Government expenditure at all levels and in the Nigerian construction industry, most construction works are procured using the traditional procurement system.This traditional method was said to be characterized with high cost of lithographic works and unethical practices. It became evident that to eliminate problems from the procurement process, there is need to employ a procurement system within the Nigerian construction industry that will be purpose driven with a view to eliminate unethical practices, minimize construction costs and guarantee efficiencies in the process that will support the implementation of new business ideas, through modern information and communication technologies. This study aimed at developing a model for e-procurement implementation with a view to enhancing the procurement process and ensuring effective contractexecution in the public sector construction projects.Themixed method approach was employed in which the Delphi method was employed as the qualitative method while the questionnaire was the quantitative method. The final survey questionnaire was birthed from a sequential exploratory mixed method. Data collected from the final survey were analysed using both descriptive and inferential statistics (mean item scores, factor analysis, Pearson correlation and multiple linear regression). The study further employed the use of smart PLS- SEM (smart partial least square structural equation modelling) to validate the conceptual framework and also to examine if there were statistically significant relationships that exist between the six (6) constructs of the model. The study concluded that the constructs that determine effective implementation of e-procurement are: external variables: Technology, people and process, drivers, benefits and operational requirements. From the model, eight out of the twelve path relationships tested were statistically significant, the model had an overall predictive value of 45.0% which is acceptable for effective implementation.The model is thus capable of predicting effective implementation of e-procurement in the public sector construction projects in Nigeria. The public sector construction in Nigeria can adopt the developed model to ensure effective implementation of e-procurement. The study further recommended that professionals in the MDAs should be kept abreast of the numerous benefits of e-procurement implementation through trainings so as to enable them accept new technologies and accept change.The top management shouldalso give its support and commitments so that electronic contracts could be enforced.

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LIST OF ABREVIATIONS

AMAC	Abuja Municipal Area council
AVE	Average variance extracted
BMPIU	Budget Monitoring and Price Intelligence Unit
BPP	Bureau of Public Procurement
CBIS	Computer Based Information System
CBN	Central Bank of Nigeria
CFA	Confirmatory Factor Analysis
CI	Construction Industry
CIDB	Construction Industry Development Board
CPAR	Country Procurement Assessment Report
CR	Composite Reliability
EDI	Electronic data interchange
E-procurement	Electronic procurement
E-Tendering	Electronic Tendering
FCT	Federal Capital Territory
FCTA	Federal Capital Territory Authority
GDP	Gross Domestic Products
HTMT	Heterotrait - Monotrait
ICT	Information Communication Technology
IDC	International Discussion Club
INEC	Independent national electoral commission
IS	Information System

IT	Information Technology
ITI	Information and Technology Infrastructure
KMO	Kaiser–Meyer–Olkin
MDA	Multivariate Data Analysis
MDAs	Ministries Departments and Agencies
NGCF	National Gross Capital Formation
NNPC	Nigerian National Petroleum Corporation
OECD	Organization for Economic Co-operation and Development
PCA	Principal Component Analysis
PFI	Public Finance Initiative
PLS-SEM	Partial Least Square Structural Equation Modelling
PPA	Public Procurement Acts
PPP	Public- Private Partnership
RICS	Royal Institution of Chartered Surveyors
SCM	Supply chain management
SME	Small Medium Enterprise
SON	Standard Organisation of Nigeria
SRMR	Standardized Root Mean Square Residual
STDA	Satellite Towns Development Authority
TPN	Trading Process Network
UN	United Nations

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Governments around the world face numerous developmental challenges in today's fast-growing and uncertain business environment. Public procurement entails more than just the buying of goods and services. It is a serious and comprehensive method that includes activities such as establishing basic requirements, negotiating contracts, and sourcing activities (Oyebamiji, 2018). The application of information and communications technology, like the Internet or web-based systems to assist government or private organizations in securing products and enterprises is critical to the efficient administration of government resources (Mahmood, 2010; Akintola & Oyediran, 2011). According to Attah (2009), procurement accounts for approximately 80% of all Nigerian government outflows, while Mahmood (2010) claims that public procurement accounts for 18.42 percent of the global G.D.P. Neupane (2014) asserts thatPublic procurement accounts for 10 to 15 percent of GDP in countries that have developed and 20% or more of GDP in developing countries. In contrast, the vast amounts of money made use of in Government procurement are public resources; therefore, answerability and clearness in the use of these resources are required to protect the public interest (Rasheed, 2004; Hui *et al.,* 2011).

The traditional procurement system is used in Nigeria to procure the majority of construction works. Paper-based advertisement, tender submission, and contract awarding are all part of the traditional procurement process, which is characterized by high work costs for lithographic quality, unethical practices, fraud, and corruption, among other things (Ajibike, 2019). Indeed, long before 1999, the Country Procurement Assessment Report (CPAR) revealed that corruption in contract awarding cost Nigeria $10 billion per year. This resulted in the passage of the 2007 Procurement Act, and the federal government of Nigeria established the Budget Monitoring and Price Intelligence Unit (BMPIU) to reduce or eliminate "sharp practices."

These reforms were prompted by the various shortcomings of Nigeria's traditional procurement method in the public sector (Ajibike, 2019). The BMPIU was a stopgap initiative aimed at promoting fair deals in government procurement and awards through price monitoring for the government (Udoma & Belo-Osagie, 2012; Adewole, 2014; Eze, 2015). The BMPIU is committed to integrity, encourages budgetary spending, and ensures project completion on time while providing value for money to the Federal Government of Nigeria (Nadi, 2009).

Nonetheless, the country was said to have lost 10 billion dollars in the year 2014 due to deceitful doings in contract awarding and project review processes (Oyebamiji, 2018). According to Ogunsanmi (2013), the Public Procurement Act in Nigeria has many shortcomings, including political interference, corruption, and bureaucracy. However, it was confirmed that the procurement Act is not being fully implemented due to a lack of structures and facilities, lack of political will to initiate modification in improvement, a lack of strong and convincing institution and corruption (Oyebamiji, 2018).To remove these concerns from the procurement process, the Nigerian construction industry needs to implement a procurement system that is purpose-driven in order to eliminate unethical practices, cut construction costs, and maximize efficiency in the process that will support the implementation of new business ideas using modern information and communication technologies (McConnell, 2009). As a result, many government

Ministries, Departments, and Agencies (MDAs) have turned to ICT to improve their effectiveness in carrying out public duties and providing services.Traditional procurement systems suffer from a variety of difficulties,including excessive tender/order processing delays (approximately 4 to 6 months), heavy paper work, lengthy multi-level analysis, physical threats to bidders, contractor cartel formation to suppress competition, human interface at all stages, insufficient transparency, and discretionary treatment throughout the tender process (Adebiyi *et al.*, 2010). As a result, a process where the use of advanced electronic technology to improve the traditional procurement process known as electronic-procurementis employed (McCormack &Johnson, 2016). Electronic-procurement is the collaborative use of electronic data and communication technology (ICT) with the end goal of improving connections between customers and suppliers, as well as other value chain partners, thereby improving both external and internal processes (Nawi *et al.*, 2014).

This research thereby aimed at creating an electronic-procurement implementation model for public sector construction projects in Nigeria in order to improve contract implementation.

1.2 Statement of the Research Problem

Studies have shown that construction industry is underperforming in lot of countries that are developing such as Nigeria especially in the terms of cost, time, quality and overall satisfaction. The causes of this under performance ranges from poor procurement system that is characterised with bottlenecks, unethical practices to a very slow system that often leads to an abortive process (Emuze & Smallwood, 2011; Alabi, 2012; Agarwal *et al.*, 2016;Oshodi *et al.,* 2017). Henriksen and Andersen (2003) opined that corruption reduction ingovernment procurement is a serious factor of the agenda for

Governments all over the globe. Corruption is however viewed as a pest that eats deeply into a nation's wealth and no nation world over is insusceptible to it (Neupane, 2014). Every organization strives to achieve the highest level of procurement quality with the least amount of investment, risk, and replication while upholding a modest market location and appearance (Grilo & Jardim- Goncalves, 2011). Owing to the sluggish nature of managing and processing transactions, these goals cannot be met in a traditional procurement system, resulting in order processing errors that are time-consuming and expensive for the company and this has to be dealt with often (Yu & shen, 2013). According to BMPIU (2005), in theNigerian construction industry, the traditional paper grounded procurement technique with its lot of inadequacies and bottlenecks is still being highly patronised and this necessitated procurement reforms in Nigeria (Gastor, 2019). Mbamali and Okotie (2012), on the other hand, noted that an increase in the use of the technical approach among construction companies and professionals would go a long way toward improving the nation's poor performance of construction projects.Electronic-procurement, according to Nigeria's finance minister in 2016, is an unavoidable option if the country is to attain transparency and efficiency (Osoba, 2016). It is well understood that electronic-procurement has numerous advantages, all of these are examples of increased clearness and answerability, standardization and observing, improved reasonable rivalry among auction-goers, avoiding human meddling, decreasing human blunders and own preference in acquiring decisions and maximizing value for money(Alam & Noor, 2009). Neupane (2014) also considered electronic-procurement to be an important tool for a genuine effort to change government public procurement methods and lessen the likelihood of corruption, as corruption is said to be a menace to economic and human improvement in all nations and is alleged to be increasing at startling rates, particularly in countries that are developing.

The Government also recognised the necessity for a public procurement structure that will instantly eradicate or lessen universal perceptions of corruption and inadequacies that threaten good governance, as well as build trust through the procurement system (Osoba, 2016). The objective of public procurement includes competition, transparency, integrity, best value and efficiency and these could only be achieved through best practices like electronic-procurement (Sope, 2015). Though, electronic-procurement implementation has begun in Nigeria, absence of evidence and exploration has hampered the expected adoption of a clear framework; in fact, electronic-procurement activities in the country are extremely limited (Mundy & Musa, 2010). However, the problem being faced in the Nigerian public sector is not of awareness of electronic-procurement but of effective adoption and implementation (Oseni & Dingley, 2014).

According to Onwubiko (2018), electronic-procurement sector is one area of Nigerian public life that has yet to get sufficient legal back ground and strategy rules to prevent financial leakages in public finance management and project finance. However, Afolabi *et al.* (2019) concluded that improved wakefulness of electronic-procurement tools and technologies, as well as the benefits accumulated from their usage, is still required amongst public sector construction partakers. The government also acknowledged the necessity for a public procurement structure that will instantly eradicate universal perceptions of fraudulent practices and inadequacies that threaten good governance, as well as build trust through the procurement system.

Against these backdrops, this study seeks to develop a model that will optimize time and cost of construction projects; provide value for money and eliminate the long chain, physical interaction, corruption and compromise that has bedevilled methods of procuring construction projects and an effective contract execution be achieved in Nigerian public sector. These gave rise to the following research questions:

1.3 Research Questions

i. What are the impacts of external variables on electronic-procurement implementation in the public construction sector in Nigeria?
ii. What are the drivers and potential values of the implementation of electronic-procurement in the public sector construction projects in Nigeria?
iii. What are the barriers to the implementation of electronic-procurement in the public sector construction projects in Nigeria?
iv. What are the operational requirements of electronic-procurement in the public sector construction projects in Nigeria?
v. How can a model be developed and validated for electronic- procurement implementation in the public sector construction process in Nigeria?

1.4 Aim of the Study

The aim of the study is to develop an electronic-procurement implementation model for the public sector construction projects in Abuja, with a view to enhancing the procurement process and ensuring effective contract execution.

1.5 Objectives

In order to achieve the aim of the study, the following objectives were formulated:

i. To identify and examine the impacts of external variables on electronic-procurement implementation in public sector construction projects in Nigeria.
ii. To identify and examine the drivers and potential values of the implementation of electronic-procurement in the publicsector construction projects in Nigeria.

iii. To examine the barriers to the implementation of electronic-procurement in the public sector construction projects in Nigeria.

iv. To establish the operational requirements for electronic-procurement implementation in the public construction sector projects in Nigeria.

v. To develop and validate an electronic-procurement model to improve public sector construction procurement process in Nigeria.

1.6 Scope of the Study

The internal stakeholders in selected public construction sector Ministries, Departments and Agencies (MDAs) in Abuja, Nigeria was the focus of the study. Stakeholders are classified by Bourne (2005) as internal and external. Internal stakeholders are construction consultants such as (Architects, Engineers, Quantity Surveyors, Builders, project Managers and Contractors) while external stakeholders are statutory authorities, financial institutions, suppliers, government agencies, Neighbours, the community, media, the general public as well as trade and industry. For the purpose of this study, the internal stakeholders such as Quantity Surveyors, Engineers, Architects, Builders and Procurement Officers were chosen because of their direct link with construction procurement activities.

The unit of analysis is the main entity being studied in a research. The "what or who" is being investigated. Individuals (the most common unit of analysis in social science research), groups, social organizations, and social artefacts are all common units of analysis. (Yurdusev, 1993). For the purpose of this research, the intended unit of analysis was the MDAs and the professionals in these MDAs were administered questionnaire to give responses on behalf of the MDAs.

Abuja being the Federal Capital Territory (FCT) of Nigeria, all MDAs and parastatals have their headquarters located in the study area and most of the construction procurements are done at the headquarters. For this reason, Abuja was chosen as the study area. There are a total number of 214 MDAs and parastatals in Abujaout of which 29 are Federal Ministries. Some of the MDAs and Ministries do not have functional construction professionals because they do not deal with construction works directly, instead, they are being serviced by the Ministry of Works. Based on this fact, the internal stakeholders in those MDAs that have professionals servicing others made responses on behalf of those selected MDAs.

The study was carried out in Federal MDAs in Abuja, Nigeria. Therefore, all the aforementioned professionals (internal stakeholders) involved in the public procurement process were the target of the research. The study obtained information regarding the procurement processes for the projects executed in these MDAs to assist in putting the research in the appropriate perspective.

1.7 Justification for the Study

Various studies have been carried out on electronic-procurement in different sectors of the government ranging from manufacturing to construction in different countries (Gunasekaran & Ngai, 2008; Mundy & Musa, 2010; Quangdung*et al.*, 2011; Oseni & Dingley, 2014;Tran & Huang ,2014;Ibem & Laryea, 2015; Ibem *et al.*, 2016;Patel, 2017; Afolabi *et al.*, 2019). Some of these studies developed models for adoption and were tested with data from different countries.

Gunasekaran and Ngai (2008) established supposed serious achievement factors and supposed barriers to electronic-procurement implementation. According to the study, enlightening businesses on the long-term and short-term benefits of electronic-procurement would intensify its usage. A conceptual framework for the adoption of electronic-procurement was developed and verified using data collected from Hong Kong companies. Quangdung*et al*. (2011) developed a theoretical impact-role-factor assessment model to aid in assessing the role of government, organization, and technology in electronic-procurement readiness within construction enterprises. The model considered an enterprise's electronic-procurement implementation readiness, the nature of the process of an enterprise's readiness, and the presence of a multiple-imperative impact regime on an enterprise's electronic-procurement implementation readiness level.This was done through a theoretical background and the model was not tested. Tran and Huang (2014) developed a model for adoption and institutionalization of electronic-procurement putting into cognizance perceived environmental support, perceived organisational support, perceived management support and perceived technological support. This model was tested with data from Hanoi, Vietnam.

In other studies, the significance of electronic-procurement in Malaysia was understood to be restricted to operational and tactical changes, with little or no significance for improving market access and customer / supplier connections (Hashim *et al.,* 2013). Due to a lack of critical success factors such as company size, human capital, and technical infrastructure, as well as the presence of barriers, public electronic-procurement by small organizations in Turkey did not produce expected outcomes of improved competition and lesser procurement charges (Gurakar & Tas, 2016).

In Iran, the adoption of electronic-procurement has been hampered by a lack of technical infrastructure as well as a non-existence of government controlling and legal controls (Bahreman, 2014; Maleki *et al*., 2017). Siahaan and Trimurni (2016) found that the interconnected legal system, infrastructure, working culture, and position of the local government head all had a significant impact on the clarity and efficiency of electronic-procurement implementation in Indonesia. While clarity provided protection and assurance for electronic-procurement implementers by preventing external and internal coercion in the supply of government goods and services, the most significant sign is the frequent change in regulations released by various institutions relating to electronic-procurement implementation and resistance to electronic-procurement implementation. According to the study, the government should promote ongoing wakefulness, training, and capacity-building of the electronic-procurement structure and mechanism as part of the recognition of public rights to public information and public services, culture, sector, and parliamentary representatives, so that the public can engage and effectively track electronic-procurement implementation.

Ibem and Laryea (2015) conducted research on the state of e-tendering in the South African construction industry. The study discovered that construction firms in South Africa primarily use e-mails and websites to help with the accomplishment of the pre-grant phase of construction procurement; and that Rogers' diffusion of innovation theory can be used to explain the factors influencing the adoption of these electronic-procurement technologies in the South African construction industry. It was also discovered that, in addition to technical problems, social challenges are obstructing the adoption of electronic-procurement in the South African construction industry.According to the findings, in order to fast-track the rate of adoption of electronic-procurement and exploit its paybacks in the South African construction industry, the country's I.C.T infrastructure must be improved in terms of both quality and quantity, as well as aggressive education campaigns, training, and skill development programs launched. In South Africa, Laryea and Ibem (2014) reported limited Electronic-procurement use in the construction sector. They attributed this to the absence of a consistent government strategy for electronic-procurement implementation; the efficiency of ICT infrastructure; the high costs of developing and sustaining electronic-procurement structures; and the supposed negative influence of electronic-procurement adoption on smaller businesses and the jobs of departmental individuals. Moses *et al.* (2013) investigated the adoption of electronic-procurement by large-scale manufacturers in Kenya and identified 5 critical success factors: staff and management commitment to adoption success; information technology and supplier performance reliability; electronic-procurement system performance monitoring; electronic-procurement system user acceptance; and top management support. The study also identified the following issues: Staff resistance to reform, absence of electronic-procurement approval by the company board, presence of old IT equipment among companies in need of revision, and absence of management support still exist in Kenya. Moturi and Sang investigated electronic-procurement use in Independent Commissions in Kenya (2016). Their findings show that the subjective norm and reliability were important factors in adoption, but compatibility was not.

Ibem *et al*. (2016) carried out a study to establish the most essential variables influencing the adoption of Electronic-procurement among members. The study concluded by identifying strategies for increasing the use and benefits of electronic-procurement in the Nigerian construction industry.In another study by Oseni and Dingley (2014), the various challenges confronting Electronic-procurement adoption and implementation in Nigeria was examined. It was identified that that the public sector in Nigeria are much aware of electronic-procurement but effective adoption and implementation have been the problems faced.

Aduwo *et al.* (2016), studied electronic-procurement in the Nigerian construction industry, revealed that common barriers were technical and infrastructure challenges. Furthermore, the study identified political, social, and cultural barriers to implementation, as well as evidence that management did not see the benefits of electronic-procurement. As a result, marginal management backing and obligation has been a main constituent in the adoption and deployment of technology, as they provide the necessary financial resources and cultivate an organizational climate favourable to the adoption of technology and the achievement of organizational aims, morals, and principles (Teo *et al*., 2009; Hashim *et al*., 2010). Adebayo and Evans (2015) investigated the level of electronic-procurement adoption in Nigeria and concluded that public sector organizations have yet to reap the full benefits of electronic-procurement at the operational level.

Even though the application of electronic-procurement has begun in Nigeria, there is little proof or research to suggest that a clear framework for the implementation of electronic-procurement is being followed (Oseni & Dingley, 2014). Afolabi *et al.* (2019) established construction stakeholders' perceptions of availability of dependable, inexpensive, and fast Internet services as the utmost important success factor for Electronic-procurement technology implementation. It was suggested that there is still need for improved awareness of electronic-procurement tools and technologies, as well as the benefits that come out from their usage, among participants in the public sector construction industry. Otherwise, this will have an impact on the provision of necessary ICT physical infrastructure as well as the formulation of appropriate policies and standards for successful electronic-procurement implementation in the Nigerian construction industry.

Despite all the studies done on electronic-procurement in Nigeria, none of the studies, developed a model for Electronic-procurement adoption in the country. Previously developed models did not take into consideration the operational requirements for the implementation of e- procurement. Founded on these facts, this study is justified because it developed a model for electronic-procurement implementation to enhance effective contract administration and project delivery in the public sector. The study put into cognizance external variables (technology, people and process), the barriers, drivers, benefits and the operational requirements of electronic-procurement as it affects the Nigerian clime. This research will be of benefit to the stakeholders and most especially to the government to curb corrupt practices by being more transparent. it will help organisations reduce cost, be more effective and efficient, reduce duplication, wider market places will be reached which will result into having more tenderers and these will enhance effective contract administration and thereby ensuring timely delivery of project.

1.8 Structure of the thesis

This is an outline of what the thesis contains. The thesis is structured into six chapters as follows:

Chapter One

This chapter provides a background to the study. The study begins by looking at the most important terms of the research which includes, procurement, electronic-procurement and corruption. The chapter looks into electronic-procurement in public and private sectors and also books relating to electronic-procurement and supply chain management . It further stated the research problem,aim and objectives, research questions, scope and justification for the study.

Chapter Two

This chapter reviewed available published academic literature related to electronic-procurement. This includes definitions, benefits, barriers and challenges to the implementation of Electronic-procurement. Each section was examined using literature from a number of sources including academic research.

Chapter Three

The chapter discusses the theories relating to electronic-procurement implementation and develops a framework based on literarture review focusing on relationships of the major research constructs.

Chapter Four

This chapter presents the research methodology for the study. It further went ahead to present the research philosophy, research strategy, data collection instruments, sample size, unit of analysis and also method of data analysis.

Chapter Five

This chapter contains information for both quantitative and qualitative data. The results of data analysis were reported and interpreted, and the relationship between different variables was revealed. This chapter contains a summary of the findings.

Chapter Six

This chapter presents conclusions and recommendations drawn from the overall study and contribution to the construction industry's existing body of knowledge. The chapter clearly presents the limitations for the study and also suggest area for further studies

CHAPTERTWO

2.0 LITERATURE REVIEW

2.1 Overview of the Construction Industry

It is assumed that the construction industry is the lifeline of each country's economy because it cut through all phases of human activity and the Nigerian construction industry is no exclusion(Ayangade *et al.*, 2009).Its contribution ranges from facilitating procurements of goods and services, construction of buildings and other facilities, and provision of labour force with job opportunities and at the same time, making an enormous contribution to GDP (Ayangade*et al.*, 2009).As time passes, the needs of man transcend from the need for just shelter to the need for more comfortable shelter with the required equipment, combined with the need for facilities in his immediate area. The provision of these infrastructures is made possible by the construction industry's expertise (Aghimien, 2020).For the transformation of people's desires and expectations into reality, the construction industry is vital. Through the physical execution of different building projects, the sector does this. The construction projects range from highways, bridges, airports, railroads, hospitals, schools, homes and buildings. These projects are essential to any nation's growth, so it is not possible to overemphasize the part of the construction industry in the delivery of these essential infrastructures (Ibrahim *et al.*, 2010).

The construction industry is normally viewed as a multifaceted industry, of numerous antagonistic connections because of various gatherings teaming up in transitory associations cooperating towards finishing a venture (Gaith *et al.*, 2012). The industry is further viewed as being the least susceptible to innovationas compared to manufacturing and other service industries and there are problems with performance improvement (Ibem *et al.,* 2016).

The building and construction sector is one of the top five sectors used to calculate a country's National Gross Capital Formation (NGCF) and GDP (Mosaku *et. al*., 2006).It has been noted that the economic growth of a country can be determined by number of physical structures built in the country (Kazaz & Ulubeyli, 2009; Ayodele & Alabi, 2011). According to Ibrahim *et al.* (2010), without substantial development and infrastructure designed to spur the economy, no country can achieve its desired growth. In every nation, this has made the construction industry vital, not only in areas of improving the economy, but also in areas of creating wealth and quality of life of the population. Ayodele and Alabi (2011) therefore concluded that a stable economy normally experiences a rise in its construction industry activities. In many countries, the construction industry accounts for 6 percent to 9 percent of their GDP Chitkara, 2004). Wase (2004) concluded that the construction industry plays a noteworthy and competitive part in any nation's phase of long-term economic growth and development with construction accounting for more than half of the total fixed capital budget.Construction industry employment is estimated at approximately 111 million jobs worldwide and accounts for almost 28 percent of all industries with approximately 75 percent of construction workers in developing countries such as South Africa (Agumba, 2013).

Akindoyeni (2005) noted that, today, the construction industry is the most dynamic industry in any country's economy. According to Oyewobi *et al.* (2016), the construction industry has been heavily criticized for its inefficiency and lack of competitiveness as a result of the fragmented nature of project execution. Its complexity stems from the fact that all other industries (small and large) and socioeconomic sectors rely on it for their domain of operation. On a global scale, the construction industry has come to be recognized as a critical industry for national development(Construction Industry Development Board (CIDB), 2017).Construction's importance to economic growth and development in any country cannot be overstated, as it contributes significantly to GDP, capital accumulation, employment and other factors (Saka &Lowe, 2010).

Many factors have been blamed for the lowly performance of construction projects in most developed and countries that are developing over time. While some of these flaws have been blamed on poor human and resource management, this list of causes has also become a prominent characteristic of slow technological growth. This situation may be caused by technological advancements and the inability of construction companies in developing countries to incorporate these advances in their service delivery (Aghimien, 2020). According to Chilipunde (2010), limited abilities in construction information technology affect the efficiency of contractors in the field of technical advancement.Mbamali and Okotie (2012) indicated that the rise in technological approach application among construction companies and professionals will go a long way in growing the productivity of construction projects in countries that are developing.

Abu Bakar *et al.* (2014) claimed that the traditional method of project delivery in the construction industry needs continuous upgrading. Building design was performed in traditional way with the use of simple tools, according to Yan and Damian (2008), before the advancement in building material technology in the mid-19thcentury, when engineers started using computers to create 2D CAD drawings. Via paper works, these drawings are transmitted and this has resulted in many issues among construction participants. As a consequence,Building programs are not being implemented in the construction industry. The use of digital technology in construction project delivery is a type of technological advancement that can help make significant changes in construction project delivery. It is anticipated that digitalization of the construction process would be able to solve issues with inadequate performance in construction. The lowly performance of the construction industry has been due to many factors. One of them is the inadequate application of technological innovations such as the use of new technologies (Aghimien, 2020).

2.1.1 The construction industry in Nigeria

The construction industry in Nigeria is estimated to account for 35% of total fixed capital formation at current buyer value and about 30% of total registered employment between 1960 and 1970 (Olatunji & Bashorun, 2006). Ayangade (2009) stated that the Nigerian construction industry's contribution has yet to match that of the Western world, including the UK and Australia, due to its developing nature.The construction industries of other advancednations are accountable for neartwenty two percent of their respective GDP's, the Nigerian situation differs as it accounts for slightly below 16 percent to its economy. However, this may be said to be complemented by the comparatively higher rate of jobs (20%) it provides for its 140 million people compared to 12% as in the case of developed countries (Ayangade, 2009).According to Mbamali (2004), this level of employment is due to Nigeria's relatively low usage of mechanization in the construction industry and the country's high dependence on the oil sector. According to Oluwakiyesi (2011), the construction industry has significantly served the Nigerian economy by creating direct and indirect employment nationally; additionally, from the

1980s to the present day, the industry has grown to about 125 times its previous size; the industry is also brimming with inherent abilitiessuch as self-sufficiency in cement generation, which will stabilize the materials sector and the huge shortage in physical infrastructure (road, rail, airport and sea port) that will be key to making opportunities for sustainable development (International Council for Building (CIB), 2004; Oluwakiyesi, 2011). Mbamali and Okotie (2012) observed in Nigeria that increasing the use of the technical approach among construction companies and professionals would go a lengthy way toward positively improving the poor performance of construction projects in the country.

Ibrahim (2008) saw procurement as the key to improving construction industry performance. As a result, it is estimated that the industry accounts for roughly 70% of the nation's fixed capital formationand 1.4 percent of GDP (Odediran *et al.*, 2012).The importance of construction procurement involves a series of interconnected and sequential processes, and the effectiveness and efficiency of these processes have a significant impact on a project's success or failure (Idoro, 2012). Though the Nigerian construction sector has an impressive average growth of 7-8 per cent per annum making it among the fastest growing sectors(Osei, 2013), however, a higher growing rate is dependent on sound and efficient infrastructure development, which makes the construction segment a critical segment (Osei, 2013).

2.2 Public Procurement

Public procurement is a significant market actor in most countries' economies, together in terms of scale and scope. Most countries, particularly developing countries, spend 10% to 30% of their GDP on government procurement (Reich, 2009; Wahab & Lawal, 2011). The sheer magnitude of procurement spending is said to have a significant impact on the economy, and its impact on the economy is becoming a challenge (Thai, 2005; Familoye *et al.,* 2015).In Africa, public procurement has traditionally been the responsibility of the government. However, it is nowadaysaccepted as a large public multi-stakeholder purpose rather than a backroom administrative function, with enormous implications for the provision of public services and thus for economic and social growth (Ekwekwuo, 2016).

According to a United Nations (UN) report from 1999, public procurement is a government business system that involves requesting, receiving, and evaluating bids, awarding contracts, and making payments. Public procurement is critical for its role in the growthcourse, the quantity of wealth it consumes and its vulnerability to outside influences. Public procurement is the acquisition of goods and services by government institutions, and it includes contracts between the government and the private sector in a variety of fields such as health care, the military, and construction (Kari *et al.*, 2010). According to a Transparency International report from 2006, public procurement accounts for fifteen-thirty percent of GDP or more in many nations (Ekwekwuo, 2016). Adusei and Awunyo-vitor (2015) estimated that procurement-related corruption accounted for ten totwenty five percent of contract value, and in some cases as much as 40% to 50%. It also established that few operations create more temptations or opportunities for corruption than public procurement.

Procurement is responsible for strategy, storage, distribution, contract management, and supplier management. According to Lloyd and McCue (2004), public procurement encompasses all functions associated with obtaining any material, services, constructions, or construction services, such as requirement specification, source selection and solicitation, contract preparation and award, and all phases of contract administration. It is intended to support government work and can cover purchases ranging from stationery, temporary office staff, and furniture to more complex and costly areas such as construction, private finance initiative projects, aircraft carriers, and other private financial initiative projects (Burton, 2005).

Public procurement is the operation of public organizations and/or institutions to carry out public duties, such as procuring goods, works, or services to meet a country's defined needs. It is the overall method of purchasing products, works, and services, based on an understanding of the need for contract management and the termination of a service contract or the useful life of an asset (Bureau of Management, 2005). In developing countries, tendering and contract awarding are two of the most vulnerable stages of the public procurement process, where the majority of corruption occurs (Oyebamiji, 2018).

Incountries that are developing,it is a serious issue; for example, in Nepal, the majority of Government contracting processes are paper-based, that increases the potential for corruption (Bhattarai, 2011); this is similar to Nigeria. The natural instinct of potential contractors is to use intimidating power to obtain the contract. Other contractors are simply unable to submit tender documents in some cases due to perceived coercive pressure from more powerful contractors. Officials from the government can be involved straight and use their official authority for personal benefit. As a result, parties with vested interests can use their positions in public procurement to benefit themselves, which ultimately leads to institutional corruption in public procurement.The accounting and auditing phases are similarly prone to corruption. Audits are not undertaken on a regular and systematic basis, making detection of corruption difficult. To ensure transparency, government audit reporting processes are unclear, reliant, and lack collaboration with other relevant authorities and institutions (Bhattarai, 2011). The public procurement process is detailed in Figure 2.1

According to Muk *et al.* (2012), the primary goal of public procurement is to ensure transparency and value for money in all public procurementaccomplishments, ensure open, transparent, and complaint-handling processes, procurement competence, and greater consistency, and promote equal opportunity for all businesses the fact that taxpayers are the primary source of government funds, and civil servants are required to use the funds in a consistent and cost-effective manner, with the greatest possible assurance that the funds will not be misused. The public expects an open and transparent procurement process, as well as the acquisition of the right item at the right time and at the right price. According to Ware *et al.* (2012), project identification and design are divided into four stages: advertising, prequalification, bid document preparation, and bid submission; bid evaluation, post-qualification, and contract award; and contract performance, administration, and supervision.

The goals of the government are to make processes more transparent and accountable. Unjustified or hidden procurement planning, a lack of need assessments, political pressure, a lack of government monitoring capacity, and inconsistent cost estimates are all potential sources of corruption in developing countries (Ware *et al*., 2012). There are more opportunities for corruption during the planning phase. Rather in developing nations than developed nations. The second phase of the public procurement process is product design and documentation, which is concerned with the technical specifications of the product or project. Occasionally, government officials will design the project and technical specifications to favour a specific supplier. In some cases, they will create an overly complicated tender in order to hide the corruption.

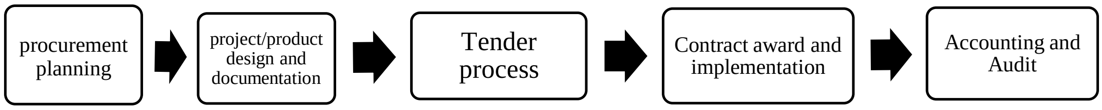


Figure 2.1: Public Procurement Process
Source: Szymanski (2007)

Procurement planning is the first stage of the procurement process used by the government or private companies, and it relates to the purchase activity plan for specific time periods. It is the process of reviewing the current procurement process, identifying current and future needs and developing an efficient method of procuring goods and services (Basheka 2009). Governments want more transparent and accountable processes. Unjustified or hidden procurement planning, a lack of need assessments, political pressure, a lack of government monitoring capacity, and inconsistent cost estimates all have the potential to enable corruption in developing countries (Ware et al,. 2012). Corruption is more prevalent in developing countries than in developed countries during the planning phase.

According to Porwal and Hewage (2013), the second phase of the public procurement process is product design and documentation, which is concerned with the technical specifications of the product or project. Occasionally, government officials design the project and technical specifications in favour of a specific supplier. In some cases, they create an overly complicated tender to conceal the corruption.

Tendering and contract awarding are two of the most vulnerable stages of the public procurement process in countries that are developing, where the majority of corruption occurs (Mc Pheraon & Mac Searraigh, 2007). It is a serious problem in developing countries: in Nepal, for example, most government contracting processes are paper-based, which increases the potential for corruption (Bhattarai, 2011); the same is true in Nigeria.However, the government in Nigeria, has identified the need for electronic-procurement. According to Neupane *et al.* (2012), other contractors are simply unable to submit tender documents due to perceived coercive threatening from other influential contractors. Government officials can be involved indirectly and use their official power for personal gain. This eventually leads to institutional corruption in public procurement, where parties with vested interests can use their roles in public procurement to benefit themselves. The accounting and auditing phases are also prone to corruption.

Audits are not performed on a regular and systematic basis, making it difficult to detect corruption. Government audit reporting mechanisms are unclear, reliant, and lack collaboration with other relevant agencies and institutions to ensure a transparent and effective flow of audit information (Neupane *et al.*, 2012).

2.3 Public Procurement in Nigeria

Nigeria is one of the African countries that has met the benchmarks set out in the African Development Bank Concept Note by establishing a new legal framework for public procurement. Procurement reforms in Nigeria have been implemented as part of a larger initiative to overhaul the public sector, aimed at increasing government performance in service delivery. There was a strong government perception in 1999 that flaws in the new procurement mechanism led to the nagging corruption problem (Ekwekwuo, 2016).

Attah (2009) said that at all stages, procurement accounts for around 80 percent of Nigerian government spending. Works and services are fundamental to daily government operations in this wise procurement of goods and as such constitute the midpointof the economic rating of the country. Traditional government MDA procurement systems in Nigeria suffer from numerous problems by manual means like excessive delays (about 4-6 months) in tender/order processing, significant paper work, time-consuming multi-level scrutiny, physical threat to bidders, contractors' cartel formation to suppress competition, human interface at each point, inadequate accountability, discretionary treatment throughout the tender phase (Adebiyi *et al*., 2010); Contractors often say that they are also unaware of announcements of procurement by the Federal Government or tenders advertised in the national newspapers or Federal Tenders Journal. Some African governments have clearly recognized that sound public procurement policies and practices are essential components of good governance and that good procurement practices reduce costs and produce results on time, whereas poor practices result in waste and delays and on the basis of this evidence, allegations of corruption and inefficiency in government this is not only evident in Nigeria but also in countries like Kenya, Zambia, Lesotho, , Ghana, Liberia, Sierra Leone (Familoye *et al.*, 2015). For a long time, the Nigerian government procurement procedure manually invited contractors to bid on projects (i.e. Invitation for Prequalification / Tender) to select successful bidders and then eventually complete the project. Purchase orders are not being handled in a timely manner and delivery deadlines are not being met in this procurement system (BPP, 2008).

Abusing the procurement act is a common practice among most government states, LGA councils, MDAsand even the Federal Government according to Ossai (2014). The observed mechanism has become so common that it prevents younger contractors from entering the system. Nigeria's public procurement system is also reportedly vulnerable to unethical practices, according to the Business Anti-Corruption Portal (2010), with as many as 45 percent of businesses expecting to send Gifts to public officials in order to win a government contract. According to research, the majority of contracts are awarded fraudulently by the government or its officials. The majority of these contracts are awarded to contractors who have agreed to send the procurement official a certain percentage of the original contract sum. It allows manufacturers to use substandard materials, provide inadequate services or even project abandonment. The existing procurement methods have the following procurement problems identified: it is assumed that each project is procured on an individual basis, that the vast majority of construction works currently undertaken are procured in a 'one-off' manner with each party seeking maximum reward for minimal risk and that little thought is given to the type of supplier relationships that must be adopted (Ossai, 2014).

Onwubiko (2018) asserted that the procurement sector is one field of Nigerian public life that lacks adequate legal structures and policy guidance to prevent financial leakages in public finance management and project funding

2.4 The PublicProcurement Act of 2007

The Nigerian public procurement Law of 2007 represents one of the country's most progressive and creditable institutional reform agendas in current years. The law is essentially a proactive response to a poor Nigerian institution seeking good governance in the public procurement sub-sector (Adewole, 2014; Ezeh, 2015; Udoma & Belo-Osagie, 2012). This is due to the fact that corruption which is a major inherent problem in many African countries including Nigeria, has resulted in crippled and poor institutions that have hampered Nigeria's sustainable growth and development. The most important public procurement legislation is divided into sections. Each of the components addresses previous institutional flaws that have plagued Nigeria's public procurement system over time (Olatunji *et al.*, 2017).

Aboki (2006) identified the following critical criteria for improving the procurement planning process: Links to overarching policy thrusts such as sector goals, MDGs, or national development plans; the fact that they were "quick wins" for maximum output in the least amount of time; Planning evidence for pre-budget submission in the form of a work plan and cash flow for each project, as well as feasibility studies, where applicable; evidence of project planning taking into account cross-cutting issues; Detailed project locations with pertinent justifications, such as a geophysical study in the case of a drilling project or mappings of existing health facilities indicating gaps; details on the project's measured outputs and outcomes, as well as their relationship to Nigeria's MDG achievement;essential performance metrics for each project, as well as baseline data to assess these indicators details on the connections between.

In an effort to combat corruption, the 2007 Public Procurement Act and the 2011 Freedom of Information Act both allow for third-party procurement oversight. According to Oseni *et al.* (2013), Section nineteen of the 2007 public procurement act requires every procuring entity must invite two trustworthy individuals to participate as eyewitnesses in every procurement process, with right to submit their observation report to any appropriate agency or organization. Section fourteen (14) of the act further reveals that "all unclassified procurement records shall be subject to public review. The ability to access publicly held records is further codified by the Freedom of Material Act of 2011, which enables access without requiring a clear interest in the information sought. In order to test conformity of a public procurement procedure with the PPA 2007, the procurement observer must have access to the following documents: Procurement plans and information, copies of invitation to bid advertising published in the minimum, two national dailies other than the federal tenders' magazine. Evidence of the advertisement on your website and notice board is also required. Copies of bid submission registries and duplicate copies of bidder receipts given upon bid submission, minutes of the opening of public bids for technical and financial proposals Copy of the Tenders Board's Sub Technical Committee's Bids Evaluation Report, Copy of the Tenders Board's Meeting Minutes Approving the Winning Bidder, Copies of any bid rejection letters or notices copies of bid acceptance notices provided by the purchasing entity to the successful bidder as soon as a winner is picked (Oseni *et al*., 2013).

2.5 Challenges to the PublicProcurement Act 2007

Public procurement Acts (PPAs) have not been able to accomplish their desired objective in most nations , especially developing nations, and this is due to the challenges faced by stakeholders in enforcing the Acts, among others, because of the economic , social and political climate in which the act operates (Familoye *et al.*, 2015). Nigeria can be referred to as a country of irony; according to Fayomi (2013), as socio-economic success has remained shallow and unimpressive over the years. It was also noted that this was primarily due to a high degree of corruption or misappropriation of public resources closely related to the procurements processes of public sector.The Bureau of public procurement (BPP) (2008) reported that as a result of the weak procurement system, Nigeria National Carrier, Nigeria Airways failed and the consequent consequence is that Nigeria and Nigerians have long had to bear this defect. Government contracts and public procurements, with the collaborative help of Nigerian public officials, became convenient avenues for rip-offs by different types of contractors (Onyekpere, 2009).

The obvious accomplishments achieved at the federal level as a result of the Public Procurement Law 2007(Adewole, 2014), It is taking far too long for all 36 states and 774 local governments in Nigeria to replicate. In addition to the fact that Nigeria’s old pre-government reform period offers rooms for impurity, having the greatest value for money in public procurement activities was also extremely difficult (Adewole, 2014). The lack of a solid regulatory system is absolute. Furthermore, the overall expectation of stakeholders is that public procurement laws should have been enforced at all levels of government by now. This is motivated by the firm belief that the introduction of the public procurement legislation is the best way to institutionalizethe public procurement system in order to achieve the primary goal of the governance reform agenda Nigeria's federal share of public spending is 48 percent according to Ikeji (2011), while the lion's share is 52 percent among 36 states and 774 local governments in Nigeria. The result of this is that the traditional public procurement law system has yet to capture a significant share of public spending (Adewole, 2014; Udoma & Belo-Osagie, 2012). Though in Nigeria, approximately 24 states have been reported to have passed public procurement legislation, although no local government has implemented a public procurement law.After excessive pressure from the World Bank, a lot of the states involved eventually passed the law unwillingly (Adeyeye, 2015), despite the considerable time and money invested, these two levels of government provided a meagre response. Furthermore, a comparison of some of the laws passed by the states reveals that the laws have been greatly distorted and have lost their veracity, thus overpowering the basic purposes of which the laws were first and foremost passed. It is disheartening to note that, considering the amount of money invested, no single local government in Nigeria saw fit to pass a public procurement edict, according to the Nigerian local government system (Adewole, 2014).

2.6 Procurement System in Nigeria

Traditional Procurement System (separated), Design-Build Procurement System (integrated), Management Procurement System (Oriented/Packaged), and Collaborative (relational, relationship-based) Procurement System are the four types of procurement systems. Each of these procurement systems is based on the relation between construction and design responsibilities (Davis *et al.,* 2008; Love *et al*., 2008).Babatunde *et al.* (2010) classified construction procurement approaches into two types: regular procurement methods and unconventional procurement methods. In the traditional project procurement technique, the three sequential phases of design, bid and build are identified as discrete tasks. A competitively bid contract is what it is called. This strategy enables all qualified contractors to bid on projects in a free and competitive environment, much like a competitive market. In Nigeria, the traditional procurement method is the most commonly used (Ajibike, 2019).

2.6.1 Frequently used procurement system in Nigeria

The traditional procurement system, the Design-Build procurement system and Collaborative procurement system are the most commonly used in West Africa (Ogunsanmi, 2013; Ameh & Ogundare, 2013; Ojo,2016& Ajayi, 2017). In Nigeria, according to Ajibike (2019), construction works are procured using the traditional procurement system despite all its inadequacies. The traditional method of procurement is also said to be the oldest form of procurement and the most widely used by government clients due to its transparency character (Ali *et al.*, 2016). Despite the shortcomings of traditional procurement method, public sector organisations the world over, still prefer the traditional approach in the delivery of infrastructure projects due to it transparency characteristic while neglecting its shortcoming of cost and time overrun (Pekuri *et al.*, 2014). Suleiman (2015) asserted the advantage of traditional procurement system as being moderately able to manage, ability to cope with variations in the contract, Price certainty at contract award, transparency and competitive equity because all tendering contractors tender and bid on the same basis, and accountability because responsibilities are separated, thereby making it easy to monitor progress.

2.6.2 Procurement system problems in Nigeria

Wahab (2006) identified the following as issues related to the procurement system in Nigeria: lack of project economic cost or benefit analysis as a way to justify project need, lack of competitiveness and accountability in the procurements of projects leading to quite high project costs. In the case of adverts, the rules in place were skewed in favour of the predetermined winner. There was no prioritizing and harmonizing of programs. As a result, many ministries were concurrently undertaking similar programs without coordination, there was an unjustifiable gap between budget and actual release, resulting in underfunding, project delays, price inflation, and project abandonment, and a preference for new projects over completion of current projects and maintenance / refurbishment of existing projects. Inconsistent and ineffective project monitoring to assess conformity with original project plans and goals, as well as frequent government policy reversals.

To take care of these procurement problems, the due process was introduced. Due Process is a mechanism for ensuring strict obedience to the rules and procedures that should guide contract award within the federal government of Nigeria in terms of openness, competition, and cost accuracy.Adebiyi (2010) summarised the due process as follows: advertisement in at least two dailies, submission of bids, opening of tenders, analysis of tenders, award of contracts, supply and installation and then final payment.

According to Oyebamiji (2018), it was discovered that large sums of money are lost each year due to procurement scam; thus, the Government asked the World Bank to help the Nigerian government establish efficiency, accountability, integrity and transparency in the Government procurements and financial management systems.

2.6.3 Why electronic-procurement?

According to the minister of finance in 2016, electronic-procurement is an unavoidable option if Nigeria is to achieve transparency and efficiency (Osoba, 2016). It was also stated that these features are required in the country's procurement system in order to improve the business environment and reduce waste. Thus, electronic-procurement addresses the issues of transparency and accountability in government spending (Osoba, 2016). Nigeria seeks to maximize the value of public funds.The range of public spending as a percentage of GDP is estimated to be 10-25%. In the 2016 budget, the country was said to have saved up to $270 million, or 5% of recurrent expenditure and 3% of capital costs (BPP, 2016). Because human meddling has been identified as a major source of rent seeking in public procurement (Azmi & Rahman, 2015), electronic-procurement will increase transparency, effectiveness, and efficiency while reducing human meddling in the procurement process to the bare minimum in Nigeria (Osoba, 2016).

2.6.3.1 Promotion of Public Confidence in Procurement Process

Citizens have frequently lost trust in the public procurement process since it is usually shrouded in secrecy, particularly in developing countries (Akaba, 2020). According to Moon (2005), the “The level of public confidence and trust in government is influenced by the general public's perception of the quality of government performance (transparency, effectiveness, efficiency, and responsiveness of public services)." A negative public perception of government as wasteful and inefficient, for example, is likely to result in low public trust in government.Through openness in the process, an effective public procurements system seeks to lift the veil of secrecy and restore citizens' trust in the system (Akaba, 2020).

2.6.3.2 Elimination of Corruption within the Procurement Process

Public Procurement, in particular, has become a focal point for corrupt practices (Basheka, 2009). It has been reported that 70% of Nigerian businesses make fraudulent payments to secure government contracts, which are typically worth 1 to 15% of the contract value (National Integrity Systems, 2004).An effective public procurement system blocks all leakages and conduits for corrupt practices while ensuring all relevant stakeholders are guided by the highest level of ethical rules and guidelines (Akaba, 2020)

2.6.3.3 Promotion of Economic Efficiency

According to Eei *et al.* (2012), some of the costs saved by using an effective order cost, administrative cost, lead-time order cost, and capital opportunity cost are all components of the public procurement system and the combination of these cost saving types is beneficial in promoting an efficient economic system.An efficient public procurement system ensures that the procurement process is carried out at the lowest possible cost while providing the best possible value. This is usually associated with the transparency function, as genuine and highly qualified suppliers with high-quality products at low prices are identified and chosen through the transparent bidding process. The cost and effort of processing the purchase order, which can be manipulated electronically, as well as inventory costs and order fulfillment time, are significant cost savings for the government (Nawi *et al*., 2017)

2.6.3.4 Promotion of Transparency, Openness and Accountability

According to Evenett and Hoekman (2005), an open procurement system provides an opportunity for scarce resources to be efficiently allocated due to the high level of competition among stakeholders and cost savings for both citizens and the government. Transparency in the procurement process fosters trust within the system, resulting in a situation in which the relevant parties' activities are guided by integrity and accountability.An effective public procurement system aims to create a platform where all stakeholders can easily access the necessary and relevant information relating to the system's operation. The creation of this platform is typically preceded by a detailed layout of some critical procedural steps associated with the process.These procedural steps frequently include the initial declaration and dissemination of tender information; the definition and dissemination of criteria for prospective bidders; the establishment of timelines and guidelines for bid preparation and submission; and information about the type of award procedure being used, as well as the development and dissemination of criteria for evaluating the quality and competitiveness of a given bid, as well as the availability of avenues for collaboration (OECD, 2013).

2.7 Electronic-procurement

Electronic-procurement is a method of purchasing practices that uses electronic commerce to identify potential sources of supply, purchase goods and services, transfer payment and interact with suppliers; It is also the purchase and sale of supplies, work and services from one company to another via the Internet and other data and networking systems, such as electronic invoicing (Hashim *et al*., 2013; Nawi *et al.*, 2017).

Electronic-procurement, according to Chang and Wong (2010), is an attempt to automate the traditional procurement system by utilizing various communication media to expedite the process between various parties.Electronic-procurement is an essential part of e-business and e-commerce. It also saves time by automating business transactions, lowering costs, improving management, and increasing transparency in business processes (Nawi *et al*., 2014). The use of advanced electronic technologies to improve the traditional procurement process is known as electronic-procurement. (McCormack &Johnson, 2016).

There are various procurement methods available, all of which revolve around the separation/integration of the associated indices: - Design - Building - Operation - Project Management - Upkeep - Finance/Business Case. Each of the above duties is assigned to one or more project parties depending on the scope of the project. The web of these capabilities describes the procurement method used on any given project. Traditional Method, Design and Build, Management Contracting, Construction Management, Framework Agreements, Partnering, Alliances, Joint Ventures, Public-Private Partnership (PPP)/Public Finance Initiative (PFI) are some of the procurement methods available (Banwo, 2016).

2.8 Public Electronic–procurement

Boer*et al.*(2001) statedthat there are five fundamental types of electronic-procurement: web-based ERP, electronic-sourcing, electronic-tendering, electronic-reverse auctioning and electronic-informing. Chaffey (2002) defined electronic-procurement as the integration of all procurement activities, such as item or service selection, purchase requests, management authorization, ordering, supplying and payment.

According to Burton (2005), public electronic-procurement is the fundamental tool that aids in the economic management of public funds. An electronic-procurement arrangement assists government sector units in procuring all materials ranging from office equipment to large air ships, as well as services and projects. The term "public electronic-procurement" refers to an inter-authoritarian data system that automates any part of the procurement process in order to improve efficiency, quality, and transparency in government procurement (Vaidya *et al.,* 2006).Public electronic procurement, according to Vaidya (2007), is the use of any Internet-based Inter-organizational Information System that automates and integrates any part of the procurement process in order to improve procurement efficiency and quality, as well as encourage transparency and responsibility in the broader public sector.

2.8.1 Types of electronic-procurement

Table 2.1 gives a summary of the types of electronic-procurement systems identified by several studies.

Table 2.1: Types of Electronic-procurement

Electronic-procurement system	Description	Authors(S) & Year
e-Informing	Gathering and distributing purchasing information both from and to internal and external parties using Internet technology.	(Boer,Harink & Heijboer,cx2001; De Boer *et al.*, 2002; Essig & Arnold, 2001)
e-Sourcing	Process of identifying new suppliers for specific categories of purchasing requirements using Internet technology.	(De Boer *et al.*, 2002; Fuks,Kawa & Wieczerzycki, 2009; Knudsen, 2003)
e-Tendering	The process of sending requests for information and prices to suppliers and receiving the response using Internet technology.	(Betts *et al.* 2010; De Boer *et al.*, 2002)
e-Reverse Auctioning	Internet based reverse auction technology which focuses on the price of the goods and services auctioned.	(Carter *et al*. 2004; Teich,Wallenius & Wallenius, 1999)
e-MRO and Web based Enterprise resource planning (ERP)	The process of creating and approving purchasing requisitions, placing purchase orders and receiving the goods or services ordered via a software system based on Internet technology, e-MRO deals with indirect items (MRO,), web-based ERP deals with product-related items.	(Bruno *et al*. 2005; De Boer et al. 2002; Fink 2006; Gunasekaran *et al*., 2009)
e-Ordering	The use of Internet to facilitate operational purchasing process, including ordering (requisitioning), order approval, order receipt and payment process.	(Harink, 2003; Reunis,Santema & Harink, 2006)

Researcher's Literature Compilation (2020)

2.9 E- Tendering

One of the electronic-procurement tools defined as "the electronic publication, communication, accessing, receiving, and submitting of all tender related information and documentation via the Internet, thereby replacing traditional paper-based tender processes and achieving a more efficient and effective business process by all parties involved" (Christenses & Duncan, 2006).Electronic tendering is a common electronic-procurement tool that is used in many countries to submit information requests and pricing to vendors and receive rejoinders via the Internet (Betts *et al.,* 2010). As a result, it is a dominant tool among government organisations for increasing transparency, improving efficiency, promoting accountability and improving the country's economic performance (Doyle, 2010). Through the electronic-tendering system, tendering opportunities are made available to the public on government websites, reducing the possibility of risk in the government procurement process, particularly in project planning, product design and documentation, the tender process, contract awards, accounting and auditing (Szymanski 2007). It also increases sales productivity, order correctness, order receiving speed, payment processing time and real-time order status information from the supplier's perspective. These benefits can be attributed to a variety of factors, including real-time order status, which is associated with transparency, effective monitoring, which is associated with a lack of control, improved contract compliance, which is associated with a lack of accountability and increased supplier information.

The following are some of the advantages of public e-tendering: E-tendering may centralize data to improved auditing and analysis (Gupta *et al.,* 2009), It reduces corruption and increases internal efficiency in government departments by eliminating direct human involvement in bidding and other work and services (Kajewski *et al.,* 2001). The government can easily and efficiently supervise all works and services with an e-tendering system. The e-tendering method improves application monitoring and tracking. It improves connection between suppliers, vendors, and citizens through an online system, increasing openness in work and services. The online bidding approach automatically lowers bidder cartels, collusion and riggings. Make government tendering faster and easier and make services available to citizens twenty hours a day, seven days a week (Kajewski *et al.,* 2001). Berger (2016) stated that e-tendering is becoming more popular with the aid of digitalization, digital procurement platforms are saving construction customers and contractors time and money. Logistics on construction sites are getting smarter, thereby creating space for further optimization of construction processes.

2.10 Electronic-procurement in the Nigerian Public Sector

Technological progress is part of the factors accountable for the poor performance of construction works in the growth of the construction industry in the country (Fadhi & Tan, 2001), while Mbamali and Okotie (2012) indicated that the intensification in the use of technological approach among construction companies and professionals would go a long way in improving the performance of construction projects A lot of studies have been done on the need for continuous change in the traditional system of project delivery in the construction industry (Abubakar *et al*.,2014). For a developing economy like Nigeria, electronic-procurement platforms are not new technologies. Instead, researchers are trying to understand the extent of usage and the accessibility of the related infrastructure among stakeholders in the Nigerian construction industry (Afolabi *et al.*, 2019)

Yusuf (2006) reported that in Nigeria, electronic-procurement activity is poor. There are most government websites in the publishing process and a few government agencies in the transaction process. Some organizations have also bypassed the contact level, offering little opportunity for requests or input from people. There are some specific issues that affect the implementation of e procurement in Nigeria, according to Mundy and Musa (2010), which were identified as: electricity supply, tele density, internet distribution, adult literacy rate and unemployment rate. The barriers that lessen the usage of electronic-procurement systems in the Nigerian setting were described by Aduwo *et al*. (2016) as mainly the price of having the physical infrastructure and the capacity to operate it. In addition, the previously traditional Nigerian construction industry is increasingly adopting the use of digital technology. This is owing to the improved recognition of the observable advantages associated with the use of ICT in construction activities (Aduwo *et al.,* 2016; Afolabi *et al.,* 2019).

2.11 Implementation of Electronic-procurement

Implementation of new expertise, including electronic-procurement, is anoutcome of a variety of singleconclusions (GamalAboelmaged, 2010). Standards and perceptions interact and intercede the demands of everyday life experiences, and technology is used to meet these demands (Belanche *et al*., 2012). Individual attitudes and values, as well as the anticipated response from a larger community, all play important roles in the spread of the innovation process. A systematic and well-made implementation strategy is critical for the prosperous implementation of electronic-procurement: thus, management would have to conduct detailed research after the decision to incorporate the method so the possibilities and potential benefits can be effectively realized(Presutti, 2003). Innovations are based on concepts, and those concepts are brought, reacted to, created and changed by people (Yousafzai *et al.,* 2007).

The lack of technological expertise and human resources experience within the organization is a major barrier to electronic-procurementsimplementation. This will not only cause difficulties in the operation system but it will also serve as a foundation of opposition to the system's acceptance since therewill be a feel of vulnerability and there may even be lostof their job due to skill shortages (Mehrtens *et al.,* 2001).For electronic-procurement adoption, the role of management is critical. If they are reluctant or unaware of the advantages provided to the organization by electronic-procurement, adoption can be very challenging. Likewise, the size of bigger companies in relationships to capital, income and amount of workers, the forms of trade in which they are engaged, whether or not they are interested in foreign trade, collaboration or partnership with larger companies, are some of the main features that will decide the effective adoption of electronic-procurement. Other important factors influencing electronic-procurement adoption include company policies, management skills, decision-makers' ability and attitude, and supply chain integration (Johnson, 2010).

Traditional procurement style has been widely used before and in an offer to overcome some of its shortcomings, other different procurement approaches have been established over the years (Alhazmi & McCaffer, 2000).Adoption of any novel technology, including electronic-procurement, is as a result of series of different decisions (Gamal Aboelmaged, 2010). Grilo and Jardim-Gonclaves (2011) stated that each organization must attain the highest quality procurement with the smallest amount of investment, risk and replication while conserving a competitive position and appearance in the market. Standards and attitudes intervene to mediate the needs arising from day to day life experiences, and technology is used to meet those needs (Belanche *et al.,* 2012). Because of its success in the private sector, electronic-procurement has been viewed as a solution to the shortcomings of traditional procurement methods(Muffato & Payaro, 2004; Tatsis *et al.*, 2006 & Teo *et al.,* 2009,). These well-established accomplishments indicate the possibility of similar benefits being realized in the public sector (MacManus,2002; Panayiotou *et al.,* 2014). Conversely, there has been very little research to ascertain this given the different environment in which the public sector operates (Schoenherr&Tummala, 2007). It was further stated that only 13% of the research in to Electronic-procurement is connected to the public sector.

Switching to and implementing online-based procurement or electronic-procurement can provide numerous benefits and advantages to any organization, ranging from administrative costs or overheads, quality, appropriate and cost-effective purchasing processes, to delivery time streamlining the sharing of necessary information, making it easier to keep track of purchasing budgets and incoming deliveries and assisting business organizations to save more money (Mahdillou & Akbary, 2014).Adoption of electronic-procurement, according to Bendoly and Schroenherr (2005), leads to increased process effectiveness and waste reduction.According to Mahdillou and Akbary (2014), Researchers and analysts believe that adopting and utilizing online-based procurement results in cost savings and increased efficiency in purchasing processes, so industries, business organizations and of course, governmental organizations and agencies have shown a strong interest in adopting electronic-procurement. Cost effectiveness, openness and visibility across all procurement processes, expedited purchasing procedures and improved internal and external interactions are the primary drivers for firms to adopt and implement electronic-procurement.

Kim and Shunk (2004) indicated that implementing electronic-procurement is not a simple matter. Its implementation will necessitate changes, updates, replacements, and adaptations across the infrastructure.Successful electronic-procurement is more concerned with the fundamental procurement aspects than with the electronic aspects. Plans for new ways of doing business, which may not generally be well received.It may necessitate changes in both the way people work and the organization's strategies. According to Guasekaran and Ngai (2008), electronic-procurement adoption has many long- and short-term benefits, including alliance and networking, cost performance, competitiveness and improved organizational performance.

Governments in mature economies are increasingly embracing electronic-procurement because it provides structure, audit trails and transaction transparency. Adoption of electronic procurement may bring sanity to procurement policies, reduce prices and improve potency. Adoption of electronic-procurement aims to improve accountability, effectiveness and transparency (Vaidya *et al.,* 2006).

The primary factors that drive a company to implement an electronic-procurement system plan differ based on the type of relationship that company has with its suppliers and consumers. These factors can be seen as motivators for e-business systems. The most important causes are the number of suppliers, the sophistication of the product, the sophistication of the design and the number of product codes for providers. When the sophistication of such factors rises, so will the sophistication of the business's interaction with its suppliers. (Muffatto& Payaro, 2004).

According to Narayanasamy *et al*. (2008) and Gunasekaran *et al*. (2009), the initial cost of implementation is so high that the benefits can be realized only after a long period of time.However, Musau, 2015 established thatappropriately implemented system can connect companies and their business practises directly with suppliers while managing all dealings between them and has been advocated as one method of increasing procurement efficiency and effectiveness.

2.12 Factors Influencing Electronic-procurementImplementation in Construction

In the construction sector, various researches have attempted to investigate the components impacting an organisations' choice to receive electronic-procurement. For instance, Rankin *et al.* (2006) discovered that the apparent benefits of electronic-procurement in accessing a larger market and expanded opportunities; decreased paperwork; increased efficiency; and decreased procurement process duration and transaction cost influenced some organizations in the Atlantic Canadian AEC industry, while Teo *et al*. (2009) discovered that firm size, top management support, perceived indirect benefits, and business partners were responsible in some Architecture/Engineering/Construction firms in Singapore. In the United Kingdom, Eadie *et al*. (2011) discovered a link between the size, procurement budget, and sector of an organization and electronic-procurement utilization in both public and private sector businesses. The authors discovered that the perceived benefits of electronic-procurement in terms of time and cost savings, increased quality, visibility in the supply chain, efficiency, and better communication were the primary factors that affected electronic-procurement use. Other aspects identified in that study included enhanced inventory management, error removal, and the ease of archiving completed work.

Daud *et al*. (2013) discovered that the perceived utility of electronic-procurement technologies in handling procurement activity, as well as the complexity of electronic-procurement technologies, influenced electronic-procurement implementation among contractors elsewhere in Malaysia. Similarly, Tran and Huang (2014) observed that technological, organizational, environmental, and managerial factors influenced electronic-procurement implementation in poor nations. Ibem and Laryea (2015) also proposed that the speed of transactions, lower transaction costs, and ease of use of the technology had the greatest positive impact on the usage of electronic-procurement in the South African construction industry. Huang *et al.* (2016) claimed in the context of developing nations that the role of government has an enormously important impact on the decision to first deploy electronic-procurement through government leadership.

It is clear from this that the attributes of electronic-procurement technologies, organizational characteristics, and the operating environment are among the factors that can influence an organization's decision to implement electronic-procurement.

According to Neupane (2014), Governments can automate all administrative tasks by implementing electronic-procurement, making procurement processes more transparent and efficient, with less opportunity for corruption.

According to Neupane (2014), by implementing electronic-procurement, governments can automate all administrative tasks, resulting in more transparent and efficient procurement processes with less opportunity for corruption. It is critical in the fight against corruption in public procurement.

2.13 Key Challenges of Electronic-procurement Implementation

Some of the key challenges in electronic-procurement implementation, according to Dai and Kauffman (2002), are: Inequalities among trading partners in the e-market place as more power lies with larger and more knowledgeable firms; difficulties in establishing a single point of contact with larger, multi-unit supplying firms; and combination issues in cross-unit supplying firms.

Concerns about information exchange security and privacy, investments in electronic devices and human resource hiring development, a lack of laws or inconsistency in laws related to electronic-procurement, such as the legality of e-mail contracts, technical difficulties in information exchanges, and a lack of standards are all factors that were highlighted by Kheng and Al-Hawandeh (2002) in the research into Singapore firms. In Nigeria, Oseni and Dingley (2014) noted that concerns such as service awareness, availability, and trust all require additional improvement in order for citizens to be able to deliver and use electronic-procurement services.

Sacks and Barak (2010) noted that the non-existence of well-trained technological workers is the major problems affecting the use and appropriation of technological developments in building, while Aghimien (2020) reported that technical know-how is the major challenge facing most construction firms with the adoption of technological innovation. It is significant to state that challenges to implementation of electronic-procurement varies from country to country.Because each country has its own set of problems.

2.14 Benefits of Electronic-procurement

In the literature, numerous prospective benefits of electronic-procurement appropriation are evident. The most frequentlydeliberated benefits are exchange costs, process shortenings, price reductions, improved controls and communications, reduction in time, effectiveness and efficiency (process and market).

Electronic-procurement, according to Davila *et al*. (2003), provides both intentional and operative benefits, with the final being additionally prominent. Other studies have emphasized the benefits of electronic-procurements. Electronic-procurements is intended to: make automatic work processes inside and through organizations, Controlexpenditure and detectprospective sourcing opportunities, improve correspondence inside and through organizations, reduction in different administrative costs, reduction in the order and fulfilment cycle, reduction in product prices and inventory levels, and improve arranging through technology and coordinated effort (Mohamed & Milimu, 2016)

The relationship between businesses and their suppliers will be profoundly altered by electronic-procurement. Traditional purchasing department will be abolished; emphasis will alternatively be on understanding the wants and, as a result, be able to move such a business forward, managing data transfers, and improving connections with suppliers by more efficiently overseeing and establishing negotiating and sourcing strategies (Hawkins *et al.,* 2004).

Shalle *et al.* (2013) asserted that the benefits of implementing electronic-procurements for an organization are classified as efficacy and efficiency. Effectiveness includes benefits such as quality procuring decisions, control over SCM (supply chain management) and managing key procurement info, whereas efficiency comprises benefits such as shorter procuring cycle, no illegal buying, lower procuring costs, tighter combinationand effective information. Schoenherr and Tummala (2007), on the other hand, did not categorize but rather stated several of the electronic-procurement appropriation benefits, such as improved and efficient bargaining, reduced exchange costs, work process mechanization, supplier choosing and proof of identity, upgraded control and co-appointment, upgraded transparency and checking, upgraded spending control and leverage.

According to Gupta (2014), by eliminating intermediaries, e-market reduces the cost of product searching and increases efficiency. It was further said that suppliers are opposed to the concepts of the e-marketssince it increases transparencies and brings about reduced price margins. According to Martens (2013), e-market help to reduce costs by making automatic the complete order placement and processing procedure, demonstrating that both the buyer and the seller can benefit from this procedure of automation.

Electronic-procurements adoption provides both substantial and insubstantial benefits, according to Panayiotou *et al.* (2004). According to him, tangible benefits are easily measured and quantifiable, and they influence the majority of owners. However, he noted that intangible benefits, such as improved customer satisfaction, better supplier integration, and improved relationships with other firms, can be similarly or more significant for the business's progress and output, but they are difficult to measurein advance.

According to Narayanasamy *et al*. (2008); Gunasekaran *et al.* (2009), most organizations focus on visible advantages, while intangible benefits can be even more essential. The following are some of the significant intangible benefits they investigated: Simpler ordering, less bureaucracy, less paperwork, more uniformity and less duplication Process standardization and increased clarity and openness Online reporting system, Data and information may be accessed quickly and easily.

Most organisations that have attempted to transcend their weaknesses and leverage their full digital potential appear to profit the most, according to Bughin and Zeebroeck (2017), with greater returns being reported than those organizations that have struggled to do the same. In the workplace, items containing electronics that can be used to collect and share information are now becoming a standard fixture. The use of smart devices that can produce data on operations, events and other performance indicators, provide insight and facilitate short- and long-term decision-making is still relatively recent for construction contractors (McDonald, 2017). However, within the construction industry, the use of these digital technologies provides major benefits (Oke *et al*., 2018). Hashim*et al*. (2013) also noted that some of the advantages of using digital technology include quality enhancement, sufficient financial savings in construction costs, administrative efficiency and partnerships, satisfaction of suitable consumers and participants, improved responsiveness and competitiveness, business growth, and the most productive implementation of projects.It can be concluded that the nature and amount of benefits that organizations can obtain from electronic-procurement are determined by the nature of the organization (Cox, 2001; Zunk *et al.*, 2014).

2.15 Barriers to Implementation of Electronic-procurement

Electronic-procurement implementation necessitates clear rules and guidelines to prevent and resolve different disputes among different stakeholders, but Ongori and Migrio (2010); Karjalainen and Kemppainen (2008) asserted that there is an obstacle to the adoption of electronic-procurements in developing and underdeveloped nations without such rules and guidelines. A lot of barriers to implementation of electronic-procurements has been mentioned by various authors in literature. Most frequently mentioned of the barriers are lack of technical knowledge and skills, lack of financial resources (Capital), resistance to change(Dai and Kauffman, 2002).The following electronic-procurement barriers were identified: a lack of market readiness for B2B activities, particularly those involving electronic-procurement exchanges; discrimination among exchanging partners in e-market places as more power lies with larger and more knowledgeable firms; difficulties in establishing a single point of contact with larger, multi-unit providing firms; incorporation issues in cross-enterprise systems; and a non-existence of trust in government.

Concern about the security and protection of data exchange, investment in electronic device, and human resources contracting developments according to Kheng and Al-Hawandeh (2002), are among the barriers to electronic-procurement implementation. Laws governing electronic-procurement are lacking or inconsistent, such as the legalities of e-mail contract, technical hitches in data exchanges and a lack of standard.Data security and protection, according to Redmond *et al*. (2012), are critical for effective digitalisation. There is a need to ensure that information and data are only accessible to the appropriate people, and programming applications play an important role in this.According to Zeng *et al*. (2012), in these widespread and frequently accessible information periods, computer security and protection procedures border on the security of critical sections of information, infrastructure, data, and assets, including scholarly properties. There is a need to ensure that access to information at the right time is free and limited to the appropriate people. Another issue is interoperability, which is defined as the ability of organizations and professions to exchange, offer, or combine data and business forms, cross-sectional data structures, or authoritative practice. Where this is missing, it is common for different systems to struggle to interact correctly(Aranda-Mena, 2006; Eastman *et al.*, 2011). As a result of the degree of fracturing, various qualities in data prerequisites, inflexibility of data schemes (standards), challenging innovation competency criteria and more comprehensive market objectives, this activity can be daunting, anticipating the compatibility of merchants in enhancing programming and interoperating frameworks (Isikidag *et al.*, 2011).

The issue of fear and resistance is another big issue that has faced digitalization in most countries and industries around the world. These two powers were identified as major obstacles to the use of emerging technology by Dimick (2014). There has been some degree of lack of confidence among organizations in new technologies. Change has been noted to be difficult for people, and companies appear to fall prey to this obstacle in most cases. This resistance, from staff to corporate decision-makers, cuts through all layers of these organizations. This was reinforced by Bédard-Maltais (2017) by noting that the resistance of workers to change is a major challenge facing Canada's small and medium manufacturing organisations. A similar observation was made by Oladapo (2007) while evaluating the encounters facing the implementation of digital technologies, especially among Nigerian quantity surveyors. Other factors have been found to greatly affect the ability of construction companies to embrace digital technology. These factors include: irregular supply of electricity, job sizes, high technology costs, fear of virus invasion, high costs of engaging trained employees, lack of interest from management and understanding of digital technologies, protection , low return on investment, staff misuse, worry of technology making professionals obsolete, legal ramifications of electronic communicationsvague security framework, and trust issues, organizational problems, management problems, and time constraints (Brewer *et al.*, 2005;Oladapo, 2007; Oyediran and Akintola, 2011; Dimick, 2014).In Nigeria, According to Aduwo *et al.* (2016), high investment costs and a lack of technical know-how required to set up electronic-procurement technology and procedures were the two most significant barriers to electronic-procurement adoption.

2.16 Operational Requirement for Electronic-procurement

According to Knudsen (2003), a firm's readiness for electronic-procurements is dependent on the availability of skilled representative andwillingness to aid transformation, innovation accessibility, and the electronic-procurement process itself According to Moon (2005), a firm's readiness for electronic-procurements is determined by three major factors: technological factors, environmental factors, and organizational factors. Firms that are generally large and authoritatively innovative find it easy to adapt to electronic-procurement.

2.16.1 Technological readiness

According to Gunasekaran *et al*. (2008), the scientific view of readiness includes all existing innovative technologies that a company needs for electronic-procurements and other electronic-business doings. It comprises technological equipment that is now available in the company as well as on the marketplace that the company can have right to use. It also will necessitate an assessment of present technologies in use and if they are attuned with new technologies, despite the market development of new innovative technologies.

Rogers (1995) recognizes that while assessing future creative technologies for enterprises in electronic-procurements and e-commerce, their similarity, benefits, observability, preliminary capability and complexity must be considered. He went on to say that resemblance relates to technological compatibility with the firm's current equipment as well as technical and hierarchical resources. The benefits will include the firm's expected future effect on company as well as operational and value-based benefits. The term "observability" refers to how management and other technical employees in the organization perceive new technologies, as well as the advantages and benefits they confer on the organization. Trialability denotes how easily the tools can be pilot tested before being fully implemented, whereas complexity denotes how simple the tools will be to use for the company's current and future employees.

All of these variables will contribute to the decision to adopt these new technologies. According to Gunasekaran *et al.* (2008); Scupola (2009), these technological perceptions are essential for the firm's effective implementation of electronic-procurement and other new technology practices.

2.16.2 Organisational readiness

The readiness of an organization is critical to the acceptance and execution of an innovative processes (Tomatzky *et al.*, 1990). Conversely, senior management support is also essential foreffective implementation of electronic-procurements and other innovative procedures (Sabherwal *et al.*, 2006). Likewise, another important component that is frequently mentioned in literature and is required for the effective adoption of any invention is the form of correspondence used by an organization to transfer knowledge (Rogers, 1995).

As stated by Kshetri (2007) and Sabherwal *et al.* (2006), employees' knowledge of IT, CEO traits and idea, employees' attitude and best management methods are critical to effective adoption of electronic-procurements and other technological advancements. Yu (2005) recognized the firm's financial and human resources as also essential for the effective adoption of technological innovations. The positive approach of top management toward innovation and technology, as well as employees' prior experiencein the organization or earlier associations perform critical roles in effective implementation of electronic-procurements (Sabherwal *et al.*, 2006).

2.16.3 Owner and manager characteristics

Executive resolutions made concerningmonetaryobligation, acquirement of new infrastructure, determining the wholebearing of the firm, implementation of novel and new technologies, and adoption of e-commerce and electronic-procurements are all related to the managerial elements of the owner or manager. When an owner or manager is hesitant to embrace new technology and ICT arrangements likeelectronic-procurements, basic obstacles or issues occur. A motivated and astute manager will always seek out and adopt new technology, as well as convey ideas, to assist the company expand (Karakaya &Shea, 2008).

2.16.4 Education level

Thong (1999) and Sarosa and Zowaghi (2003) discovered that a certain standard of education is required for successful adoption of breakthrough technologies.A high level of education is required for important management employees and owners to comprehend and accept significance of novel ICT solution and recognize the value to the organization. It will give them room to share such variations and receive response both in the organization and with other global enterprises.

2.16.5 Level of ICT knowledge and skills

According to Duncombe and Heeks (2002), developing-country organizations' attempts to adopt ICT-based arrangements are hampered by a lack of resources, data access, and managers' skills and aptitudes. According to Molla and Licker (2005), the inability to obtain ICT-based measures in countries that are developing is related to little literacy rates, the level of ICT capabilities and knowledge of managers/owners, as well as infrastructure and resource constraints. Wilson *et al*. (2008) discovered that the firm's financial resources were less important than the level of ICT knowledge and skills.

2.16.6 Security, privacy and trust concerns

Security and trust matters are serious to the effective implementation of electronic-procurements (Bharat & Abhijit, 2010; Humphrey *et. al.,* 2003). Individuals avoid online trades due to security concerns, and they are more comfortable accepting e-mails that do not require online payment (Karanasios &Burgess, 2008). According to Kim and Benbasat (2009), the vendor, the Internet Service Provider (ISP), or an outsider, such as PayPal in an online transaction, can provide assurance of trust in software.

2.16.7 Cost implications and financial ability

The concern of financial resources is extensively acknowledged in many organizations in countries that are developing that do not use electronic-procurements and other ICT solutions. Cost of acquiring hardware and software, hiring advisers and specialists, starting up the entire structure and then maintaining it over time can be prohibitively expensive for some organizations (Lee *et al*., 2013).

2.16.8 Organisational size

When deciding whether to use electronic-procurement and other ICT solutions, the size of an organization is especially important (Bharati & Chaudhury, 2006). It was also discovered in the United States that enterprises of all scopes had embraced basic and simple ICT measures, but larger firms with better budgetary and HR resources had adopted more advanced and complex ICT arrangements. Better strategic and financial resources, according to Karakaya and Shea (2008), enable larger organizations to embrace new technology.

2.17 Relationships between Electronic-procurement and Procurement

Primary benefit of electronic-procurements is that it provide a single data entrance point, allowing all data to be inputted in one location rather than several. Electronic-procurement improves connectivity by making data interchange more efficient. Records are exchanged or transferred faster, and information transmission errors are avoided. In the lack of an electronic-procurements system, the organization may have a need to hire twice or thrice as many persons to handle procurements tasks (Gunasekaran *et al.*, 2009).Electronic-procurementsmakes order monitoring very convenient and it is easy to control order shipping, current status and delivery. Both sales and purchasing departments have the most modern type of data, which in conventional manual procurement processes is often not the case. In the absence of such systems, sales staff must maintain constant communication with the purchasing department and respond to numerous enquiries from them, which electronic-procurement processes eliminate. This also enables sales reps, if necessary, to respond to queries instantly by checking on their computer system (Gebauer, 2002; Kurbel, 2013). As a result, the procurement system must be sufficiently robust to accommodate various channels used by prospective customers and provide their own particular formats and interfaces (Bedell, 2002; Malik, 2014).The old traditional paper-based system is still used by many suppliers or manufacturers all over the world, particularly in developing countries, and they do not have the digital format needed to succeed in electronic-procurement (Aboelmaged, 2010). Many suppliers choose to have a new electronic-procurement system rather than updating the existing systems, which is likely to be expensive, while the supplier continues to implement the old one. It is evident that employees comply with the terms of the contract 65 percent of the time, but companies fail to comply on 22 percent of the occasions and thus incur more costs than they would otherwise (Aberdeen, 2006; Lee and Wang, 2013). Likewise, some of them may not have the trained personnel to run the programs, or they may not be willing to take advantage of company price concessions and may resist them (Islam, 2015).

2.18 Role of Public Electronic-procurement in Public Procurement Processes

All procurements procedures should be open and transparent to the government. A variety of issues in the procurement process, such as unjustified or hidden procurement preparation, a lack of requirement assessments, political pressure, a lack of government monitoring capability, and inconsistent cost estimates (Ware *et al.*, 2012), may all contribute to corruption. Public electronic-procurements will play a vital role in the prevention and eradication of corruption (Neupane, 2014). The public and bidders can use the electronic-procurement government web page to monitor and track all procurement activity.It helps by revealing all important purchase information. It is impractical for a government official or procurement officer to keep classified information hidden from the public. The web portal for electronic-procurement lists all of the project's technical requirements, making it difficult for officers to include new criteria for own benefit. The phase of public procurement process design and documentation is allegedly among the fraudulent public procurement processes because it refers to the technical specifications of the project. Often, product and technological requirements are planned by procurement or government officers in support of a particular supplier. In certain situations, an overly confusing tender specification is intended to cover corruption. In presenting all project specifications on the web site, Public electronic-procurement platforms will be critical in enabling all bidders to access and review all project specifications and to establish compliance with the standard document. Mc Pheraon and Mac Searraigh (2007) reported that tendering and contract awarding stage is where most corruption exists in developing countries, it is the most vulnerable stage of public procurement processes. And this is reportedly a big problem, principallyanywhere government procuring procedures are still paper-based, more opportunities for corruption exist. Among the major challenges that developing countries face is the involvement of unwanted individuals in tendering processes, which could be mitigated by public electronic-procurements systems. The OECD (2008) stated that public electronic-procurement will play a vital role in lowering the possibility of corruption in the public procurement process in order to address these issues. It improves public service accountability and honesty through processes such as tendering, procurement, ordering, and auctioning. Internationally, electronic-procurement is recognized as an excellent tool for detecting corruption and abuse of authority (Sohail & Cavill, 2008). Pictet and Bollinger (2008) discovered that public electronic-procurements aid in the fight against corruption by decreasingdirect contact, which is the avenuewheremajority of bribe demands occur. Governments, as asserted by Shahkooh *et al*. (2008), seek strategies to eliminate corruption in public organizations. Because it eliminates the possibility of arbitrary acts, e-government is one type of resolution to corruption issues. It helps in the reduction of bidder cartels, collusions, and manipulation in politically sensitive countries such as Nepal, Bangladesh, Iraq, Sudan and Myanmar. Public bids are won without fair competition in some corrupt nations (Thai, 2005).Real-time access to procurements information, procurement system automation, and procurements system security are the utmost significant perceived anti-corruption factors in public electronic-procurements technology, increased completion of public tendering, reduced human intervention in public tendering, transparency, efficiency, quality, and accountability in public procurement. Developing nations have previously adopted and employedelectronic-procurement at the public and private levels. Singapore, Australia, New Zealand, the United Kingdom, the United States, Denmark and Japan, for example, already have implemented public electronic-procurements and have reaped numerous supposed benefits from successful electronic-procurements in both the public and private sectors. In wealthy countries, deployment of government-level electronic-procurement is in its early stages. Some governments in affluent countries use electronic-procurement, while others are testing it. Some governments are waiting to see how electronic-procurement results turn out (Neupane, 2014). Many less developed countries, on the other hand, have recently concentrated on electronic-procurements systems as a critical tool for reducing corruption by opening up government procurement processes to public competition (Neupane, 2014).

2.19 Comparing Traditional Procurement and Electronic-procurement

It is apparent that implementing electronic-procurement will provide a company with numerous benefits. To begin with, it is simple to select and search for goods because the consumer is directed specifically to the items he or she is interested in, rather than having to browse a wide range of catalogues from various suppliers, and comparative prices are displayed, allowing him or her to select the best one. This method can save a substantialamount of time and money. According to Soares-Aguiar and Palma-dos-Reis (2008), automated selections and requisitions decreases administrative costs by thirty three percent in comparism to traditional procurements processes. It was also stated that automatic requisitions significantly reduce costs while increasing the company's net profits.According to Croom and Brandon-Jones (2007), creating an inter-organizational network considerably boosts the efficiency of order fulfilment for organizations, which, through its just-in-time strategy, lowers the cost of inventory management. According to Kim *et al.* (2015), there is a significant reduction in several planned business tasks like product range, description, procurement and contracting, enhancement and cost. It was demonstrated by comparing a company's cost-to-benefit and revenue-to-benefit ratios before and after implementing electronic-procurements, as well as discovering significant business financial leverage (Hsin *et al.,* 2013). It was discovered that electronic-procurement respects the status of end-user contracts and assists the organization in negotiating price reductions through improved capture, improved confidence, the dependability of spending data, and improved system enforcement.Additionally, it enables organization to regulate its cash movement through efficient e-payment that improves the accounts department's performance by a reduction in the labour required to handle transactions. Likewise, e- invoicing can be kept in a place where both the organization and the vendors can see it, making the procedure fair and straightforward (Liu *et al.*, 2013).

Mahdillou and Akbary (2014) used General Electric's employee e-sourcing Trading Process Network (TPN) to demonstrate how it significantly lowered the company's costs. In TPN, the acquiringsector solicits bids from pre-qualified suppliers who post their proposals on the internet, and the finest one is chosen following crucial talks. TPN handles operational activities automatically through electronic transactions, lowering the expenses associated with all operations.By locating new suppliers and automating requisition, payment, and order processing, TPN saves between 5percent and 20 percent on costs. SAP ERP also provides technologies that automate and impact other business operations such as human resources, accounting, sales, and purchasing. Similarly, Oracle's "Procure to Pay" software can manage the entire procurements cycle, from automated selections and payments to cost and spending analysis, and predicts a 10percent to 20 percent cost savings depending on the firm's size and shape (Monczka *et al*., 2015). As the cost of good stock storage falls, so will the cost of time to market and inventory storage.Another well-known e-company, Dell discovered that updating daily requests and tallying them with incoming supply flow is critical for business success because it lessensdifferent procurements, production, transaction, and storage costs. (Qrunfleh & Tarafdar, 2014). Table 2.2.

Table2.2: Comparing Traditional Procurement and Electronic-procurement

Features	Traditional procurement	Electronic procurement
Product selection	Search a large catalogue of products to choose from	Personal views, shopping lists and templates online
Authorisation and requisition	Multiple levels of authorisation and approval, which take a lot of time	Automatic approval based on certain well-defined business rules (fast)
Product order transmission	Post, E-mail or Fax, where supplier has to retype the order data upon receipt	Online order dispatch and automatic update of order status and details via a central hub
Payments	Involve a slow three-way approval of product orders, matching invoices and receipts	Very quick, based on receipt of notice
Analysis	Ad hoc	No link to supplier performance

Adopted from Altayyar (2015)

2.20 Perceived Future Organisational Performance with Electronic-procurement

Electronic-procurements has been identified as anextremely potent tool for refining performance in terms of cost reduction and streamlining. It has also been discovered that centralization is particularly beneficial in the procurement processes and has a constructive impact on the success of the procurement processes (Van Weele,2005). By centralizing the process, the probable negative consequences of electronic-procurements can be significantly reduced. (Van Weele, 2005). The potential negative consequences of electronic-procurement can be considerably condensed by centralizing the process. Electronic-procurement assists smaller businesses in aligning with larger enterprises, learning from their experiences, and being motivated to open themselves up to more competition where new ideas can be learned.

According to Wamba *et al.* (2008), electronic-procurement improves trade relationships between diverse partners, resulting in a basis of reasonablegain for the two sides(the buyer and supplier). Near ties among diverse company associates help to increased efficiency and benefit all supply chain stakeholders (Wamba *et al*., 2008).According to Salkute (2013), many organizations short of operational logistics capabilities can nonetheless benefit from partner companies' logistical knowledge and experience. According to Liker and Choi (2004), e-relationships among different trading companies allow them to learn from one another, thus improving the quality of the product and service, lowering costs and sparking creative ideas, as well as allowing the supplier to deliver goods more quickly.Johnson (2011) discovered that EDI (electronic data interchange) with preferred purchasers allows for the speedy and effective establishment of preferred price agreements in real time. According to Parida and Sophonthummapharn (2010), the most productive and competitive electronic-procurement systems need the engagement of suppliers or suppliers and are checked during the creation of such systems. This will provide businesses with multiple design possibilities from which to select the one that best matches their organization. It will encourage various parties to collaborate in order to study new concepts, increase product quality, and minimize service and manufacturing costs (Christopher & Gattorna, 2005).These types of collaborations across multiple business partners lead to organizational learning, which aids in decreasing waste and enhancing operational speed, efficiency, reliability, and confidence (Selnes & Sallis, 2003).

According to the preceding analysis, organizations and their partners improve their performance by implementing electronic-procurements and other e-business tools. Likewise, the study found out that the more partners in a supply chain, the greater the odds of performance improvement.

2.20.1 Improve performance in terms of streamlining processing

Procurement-related processes are critical to any company's productive conduct and operations. For critical strategic decision-making, every organization requires tamper-proof, usable, exact, accurate and original memory. Transparency, documentation, and record keeping in electronic-procurements not only improve transaction and delivery times, but also help reduce financial risks and legal liabilities.Electronic-procurement, according to David (2005), is unavoidable in the modern corporate age due to diverse and demanding consumer needs and increased competition. It was also stated that electronic-procurement improves procurement efficiency by streamlining production.Electronic-procurement solutions are crucial because they give documentation evidence that supports an organization's needs while also making customers happier and increasing business productivity through efficient inventory management. According to Bolton (2006), electronic-procurement systems enable small and medium-sized firms and other organizations to securely access, track, and retain key business information and documents, as well as assist management in making efficient and effective business choices.

2.20.2 Information sharing in electronic-procurement

According to Malone *et al.* (1987), electronic data and communication interchange is a significant approach to reduce transaction costs and control supply chain management in order to arrange transactions and output. The phenomenon of time-efficient information movement, which makes such information accessible in an open and transparent manner whenever necessary, is referred to as information exchange (Eng, 2004). Furthermore, Eng (2004) stated that such information exchange is bound to improve any organization's performance (seller or buyer). An e-marketplace, for example, is a type of electronic technology that coordinates and monitors commercial processes across multiple organizations, improving knowledge flow and reducing misunderstanding while also lowering the cost of business transactions (Eng, 2004). Such adaptability is not available in other buying strategies.According to Barratt and Rosdahl (2002), electronic-procurement makes the search for buyers more transparent and simple. While researching supply chain management in the e-marketplace, they discovered such cost reductions in three distinct dimensions including improved operational performance, lower unit costs, and restructuring corporate processes. Croom and Johnson (2005) studied supply chain efficiency and discovered that electronic-procurement improved internal performance, reduced costs, and increased process compliance.

Electronic-procurements would have strategic, organizational and planned benefits for the corporation in the new future (Attaran, 2001). Nonetheless, senior management's trust determines the extent to which the mechanism can favourably improve the organization's efficiency. Top management experience and an in-depth grasp of the process, as well as the financial, technical, and human resource expenses involved, are required for the organization to reap both short- and long-term benefits from the process's implementation. Similarly, they must comprehend the process's impact on the company's relationships with both suppliers and purchasers. In this situation, small and medium-sized firm owners and management have generally prioritized short-term rather than long-term goals. They must be aware of changes in the global market climate, as well as the use of emerging technologies, particularly the internet, the concepts of virtual supply chains, resource planning and supply chain management. Emphasis should not be solely on monetary achievements, as the firm has significant non-financial aspects as well. Wamba *et al.* (2008) discovered that e-product codes and radio frequency identification technologies have a favourable influence on firms' return on investment, inventory turnover, and overall cost and quality.

2.20.3 Short- and long-term organisational performance

According to Gunasekaran and Ngai, the degree to which the top management agree that electronic-procurements will have an influence on a company's prospective short- and long-term performance is critical in electronic-procurements adoption (2009). According to Humphrey *et al.* (2004), the benefits of electronic-procurements are both short- and long-term, however due to the high initial cost, first implementers would enjoy true benefits in the long run, but the benefits can be achieved in short run later in the company's course.

Furthermore, according to Humphrey *et al*. (2004), implementing electronic-procurement is a both win situation for both SMEs and their suppliers because both short and long-term benefits are realized. According to Wamba *et al*. (2008), electronic-procurements has the potential to improve organizational performance and generate long- and short-term performance gains in areas like cost savings, reinforcing supplier relationships, and increasing customer satisfaction and company's competitiveness.

2.20.4 Improve cost performance in organisation

Electronic-procurements improves inter-organizational cooperation and collaboration by increasing sourcing opportunities, lowering transactional costs and increasing productivity (Subramanian & Shaw, 2002). Electronic-procurement will aid in the facilitation of dynamic and demanding teamwork in the age of demand-side economics. More visible and energetic human interaction is required in modern business concerns with partners and stakeholders both within and outside the organization. According to Croom and Johnson (2005), electronic-procurement assists managers with financial control, promotes accountability, and delivers strong process efficiency. It boosts the efficiency of management information systems and extends accountability to external stakeholders. According to Christopher and Gattorna (2005), electronic-procurement allows businesses to create long-term price plans that significantly cut total purchasing costs. Transactional expenses and purchasing costs are the two key sources of cost for businesses, and both can be reduced by implementing electronic-procurement (Kopczak & Johnson, 2003).

2.20.5 Organisational competitiveness

Electronic-procurements facilitates collaboration between departments to guarantee that goods of the appropriate quality are obtained from the appropriate source at the appropriate time, resulting in customer satisfaction. Croom and Johnson (2005) discovered that by implementing electronic-procurement, which is critical to an organization's business performance, internal customer satisfaction can be raised. Electronic-procurements, according to Fiala (2005), has the capacity to incorporate diverse procurement procedures with suppliers and partners that is a critical precondition for improving the feature of purchased items and responding to market variations. Closer alignment and collaboration with different agencies, suppliers, and business partners permits companies to forecast marketing patterns and achieve efficiency and customer loyalty at the right time, ensuring procurement success(Wu *et al.*, 2016).

2.20.6 Organisations' revenue increase

One among the primary motivations for SMEs to use electronic-procurements is to grow sales, either by growing market share or by lowering expenses (Parida & Sophonthummapharn 2010). According to Salkute (2013), one of the primary benefits that SMEs seek from the use of electronic-procurements is the ability to conduct transactions and generate revenue. According to Salkute (2013), the use of electronic-procurements helps firm savings through business transactions, increased business transparency, and standardization of various procedures. Finally, these standardization and cost-cutting procedures contribute to an increase in corporate revenue.

2.21 Electronic- procurement Models

Electronic-procurement models are available in literature. The models which were of interest for this study were the Gunasekaran and Ngai (2008) and Tran and Huang (2014) models which were tested in different countries. These models were country specific and did not take into recognition the operational requirement of the Nigerian environment. A conceptual framework was thus developed from literature to suit the lapse of these models (Figure 3.1).

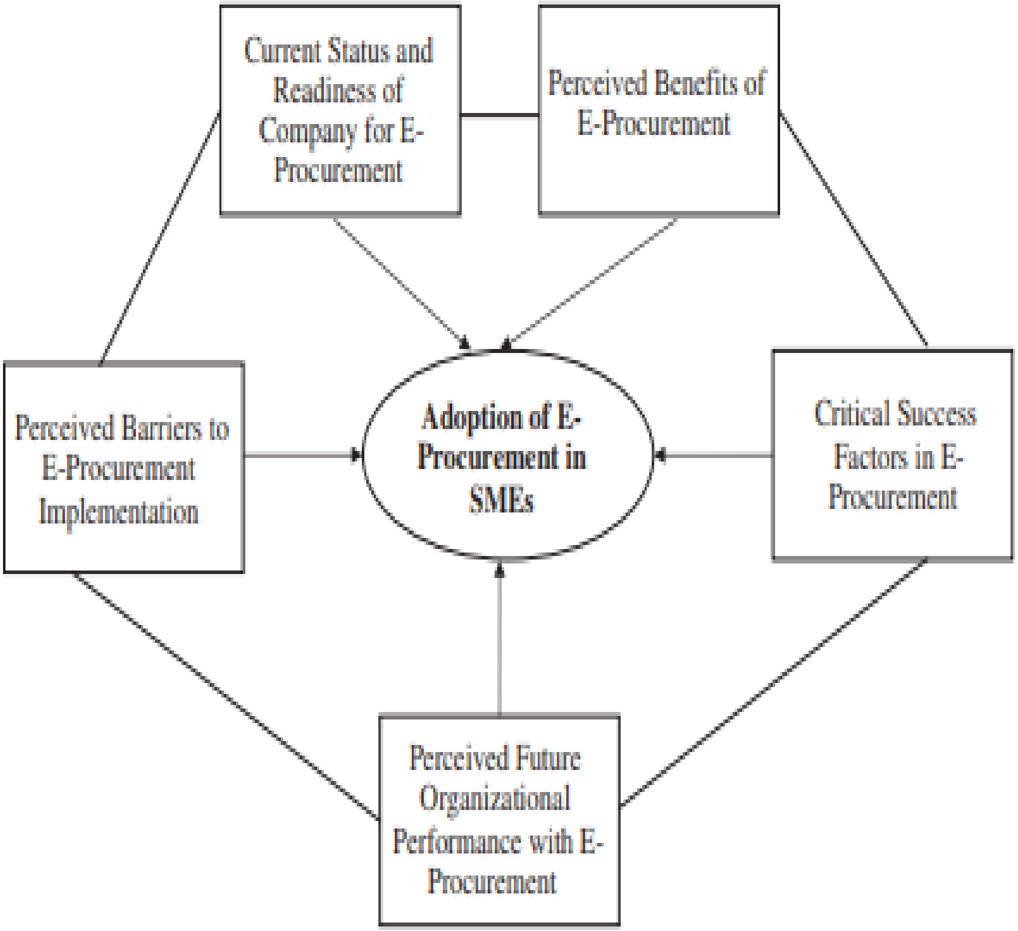


Figure 2.2 Gunasekaran and Ngai (2008) model

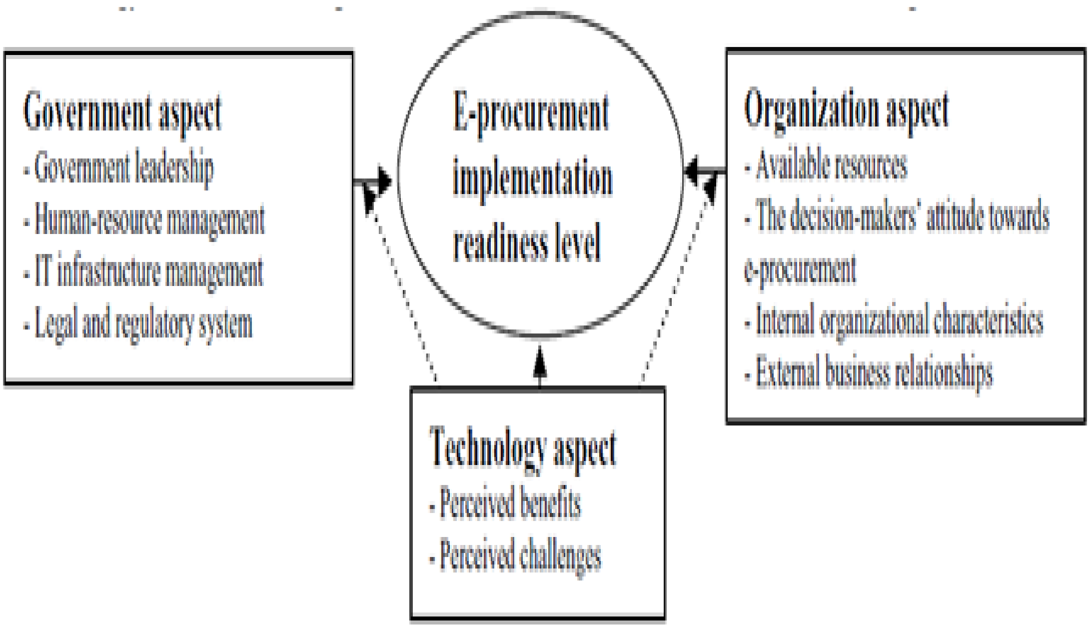


Figure 2.3Tran and Huang (2014) model

2.22 Research Gap

According to literature, there is much study on electronic-procurement implementation in the private sector but very little in the public sector; the few works that have been done have concentrated on the building industry, which is a subsector of the construction industry. It was also stated unequivocally that there is no legal framework/model in Nigeria for the implementation of electronic-procurement. The available models which were looked at were country specific and did not take in to cognizance the operational requirements of the Nigerian clime. Literature also shows that the factors for implementing electronic-procurement are the same in all industries, from supply to manufacturing and construction. Based on these findings, the necessity for this study arose; this study was conducted in the public construction sector, a model for implementation in public sector construction was also produced, and variables unique to the construction industry were identified.

CHAPTER THREE

3.0 THEORETICAL ANDCONCEPTUAL FRAMEWORK

3.1 Theoretical Framework

Theories are explanations for a natural or social behaviour, occurrence, or phenomena (Bhattacherjee, 2012). According to Bacharach (1989), scientific theory is a set of constructions and ideas that together characterize an interesting event with a reasonable, systematic and coherent explanation under particular assumptions and borderconditions. According to Leedy and Ormrod (2005), a theory is a systematic body of ideas and principles envisioned to explain a certain occurrence. Thus, theory offers the systematic formulation and arrangement of concepts in relation to a certain phenomenon, so that the ideas that arise from the process are interconnected (Tavallaei & Abu Talib, 2010).Theory has been employed as a variation of intent dependent on the field of study. Theory should establish scientific knowledge in scientific research and has met three requirements: a clear description of the observed relationship in relation to its relationship to a phenomenon, consistency with the discovered knowledge and observed relationships, a confirmation and revision device and potential study for further investigation (McMillan & Schumacher, 2001).

A theoretical framework has various advantages for a research project. It enables researchers to define the study philosophically, methodologically, and analytically; it guides researchers in situating and contextualizing formal theories into their studies; it guides a researcher's choice of research design and data analysis plan; and it also guides the nature of data to be collected for a specific research (Lester, 2005; Grant & Osanloo, 2014; Ravitch & Carl, 2016). As a result, the theoretical framework helps the researcher choose the optimum research approach, analytical tools, and procedures for the research inquiry.It makes study findings more significant and generalizable (Akintoye, 2015). Because the aim of this study is to create a conceptual framework for electronic-procurement, the following underlying theories were investigated.

3.2 Innovation AdoptionTheories

Over the years, research has focused on the selection of innovation in numerous situations. Various terms have been used in studies, such as ICT (Information and Communication Technology), IS (Information System), and IT (Information Technology) (Information Technology). Regardless, these phrases are not mutually exclusive and are used interchangeably (Venkatesh *et al*., 2003; Gefen *et al*., 2003). It is clear from this that numerous researches on IT, IS, and ICT adoption can be used to the current study. Diffusion of Innovation (DOI) theory, Technology Acceptance Model (TAM), and Theory of Reasoned Action are some of the models that will be employed in this context (TRA).

3.2.1 Diffusion of innovation (DOI) theory

According to Rogers (1995), innovation refers to a topic, thinking, or activity that an individual or organization regards as novel. Diffusion was also said to be the method by which an innovation is disseminated over time among individuals within a social environment through specialized routes.Rogers (1995) had additionally expressed that an innovation is received just in the event that it is achievable for the relationship as far as cash and ability, isnot complex, is perfect with the current developments and models in the associations and if itsmeritsfor the organisation can be foreseen. In another study, Rogers (2003) defined innovation as "knowledge, practice, or entity viewed as new by a person or other unit of implementation." Baskerville and Pries-Heje (2001) and Zott *et al*. (2012) recognized that innovation occurs in an unstructured manner and is fuelled by an inner or outer clock rather than an organized objective stepwise process, whereas Venkatesh *et al*. (2003) saw it as playing avital role in increasing adoption intent and actual acceptance of a technology. Since 1960, a wide range of improvements, from agricultural implements to organizational changes, have been investigated (Venkatesh *et al*., 2003; Thakur *et al*., 2012).

The process of introducing an innovation into a social system through various communication channels throughout time is known as diffusion of innovation (Rogers, 2003). Adopters in this approach are classified as early adopters, innovators, late adopters, early majority adopters and laggards. If a technology is viewed as novel and relevant, it is deemed innovative (Parveen, 2014). If technology is deemed innovative and relevant, it may aid an organization's decision-making process; therefore, innovators will be willing to test the new technology by seeking greater information about new technical items on the market.The new and relevant technologies will be used to improve the organization's internal efficiency and effectiveness in coming up with innovative ideas and making swift decisions in bringing those innovative ideas forth within the organization (Thakur *et al*., 2012).

Parveen (2014) defined relative advantage as degree to which the innovation is thought to be higher than the traditional one. It makes no difference whether the innovation has impartial benefits or not (Rogers, 1995). The essential concept is how the innovation is perceived and if people view the innovation to be advantageous. Money, social standing, convenience and enjoyment can all be used to calculate relative advantage. The bigger the perceived proportional advantage of an innovation, the faster it will be accepted. Rogers (1995) suggested that another characteristic of an innovation is compatibility.It is the measure to which the innovation is thought to be constant with the traditional idea in terms of current values, prior experiences, and future adopters' demands. A concept that is incompatible with a social system's values and conventions will not be adopted as rapidly as a suitable innovation. The degree to which an innovation is difficult to utilize and grasp is referred to as its complexity. Some innovations may be easier for people to understand, while others may be more difficult because they require greater expertise to comprehend (Duan *et al.*, 2010).

Trialability is the degree to which it is believed that the innovation has a chance of being implemented before determining whether or not to accept it. According to Rogers (1995), the observability factor relates to the degree to which the outcomes of the invention are visible to others. According to Rogers, the easier it is for people to see the outcomes, the more likely the innovation will be adopted. According to Duan *et al*. (2010), such prominence encourages peer debate of a new idea; for example, an adopter's friends and neighbours frequently request review of the new innovation.

According to Parveen (2014), diffusion of innovation hypothesis is heavily criticized. One of these complaints is that it fails to take into account the social environment of IT adoption in enterprises. The idea has also been criticized for its nature of being too basic to take care of difficulties of social environment in which IT adoption and spread occur. For IT adoption to be effective, social and environmental viewpoints must be included to technical perspectives. IT adoption processes must be based on social-technical adoption models rather than a technological linear phenomenon (Jokonya *et al.,* 2012; Weilbach & Byrne, 2010), and the inability to understand the human environment and organizational context is a limitation of this theory, according to Du Plooy (1998).

This theory is appropriate to this study because electronic-procurement in the public construction segment meets the five characteristics of the diffusion of innovation theory that were previously established. Electronic-procurements in the public sector has a clear advantage, as mentioned in the literature: it is compatible with organizations, it is not overly complex, it requires little more expertise to grasp and it is feasible.

3.2.2 Technology acceptance model (TAM)

In wider information system literature, this paradigm has been referred to as ICT adoption, technology acceptance, and Information System implementation (Alam *et al.*, 2009). Davis (1986) established this model (TAM) to explain user acceptance of technology in various circumstances. Davis (1989) recommended the TAM, however, in order to explain the determinant factor of computer acceptance and user behaviours across a wide range of end-users, user groups and computing technology. According to Zhang *et al.* (2012) practical study utilizing TAM reveals that outcomes are not entirely steady, it is undeniably valuable as a takeoff point for understanding IS utilization. TAM describes and forecasts the systems employed in its two constructs: perceived usefulness and perceived ease of use, both of which are impacted by external variables (such as technology, people, and process) (Dulcic *et al.*, 2012).In the situation of bringing about non-material or material benefits, the convenience of innovation can be recognized with its direct or backhanded effect on client accomplishment. According to Davis (1986), perceived ease of use is an essential part that reveals how tough and upsetting labour might be simplified as a result of technology adoption.

To determine a person's acceptance of IT applications, three models have been widely used by many analysts in the IT discipline. These three important models are the Technology Acceptance Model (TAM) (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), and the Unified Theory of Acceptance and Use of Innovation (UTAUT) (Venkatesh *et al.*, 2003). TAM (Davis, 1989) has two major determining factors:

perceived usefulness (PU) and perceived ease of use (PEOU), or, in other words, by the scientists to identify its person's acknowledgment. This investigation evaluates various models and selects the TAM as the hypothetical foundation for the momentum investigation.

Venkatesh and Davis (2000) created TAM 2, which expanded TAM to include subjective models as a determining factor of perceived utility. Several research have expanded the TAM's basic structure and examined external variables that influence important concepts like as perceived ease of use, perceived utility, and intention to use. TAM had been utilized in a number of research to assess the acceptability of various technologies (Cases, 2010). It is an appealing instrument due to its ease of use and execution, even if it has been utilized with few revisions or alterations in the majority of the research (Dulcic *et al.*, 2012). Regardless of the fact that TAM is a robust and cost-effective approach, IS researchers have identified a vulnerability in it.

3.2.3 Theory of reasoned action (TRA)

This model has been widely utilized in social science to determine purposefully suggested human activities (Ajzen & Fischbein, 1980). In Fischbein and Ajzen (1975), social influence, attitude of mind, and expectation all work together to shape behaviour. According to the TRA, subjective norms (SN), which correspond to what other persons perceive an individual action in a gathering or community and individual attitudes toward completing a certain behaviour (ATB) jointly determine behavioural intention (BI), Scholars such as Hameed *et al.* (2012) discovered a clear association between TRA factors and their significance in determining an individual's behaviour toward a specific application. The study was crucial in determining anoptimistic association amongst intentions toward knowledge sharing.It is also relevant in determining the attitudes of management, personnel, and other stakeholders regarding the selection of novel technical applications, such as electronic-procurement. This idea is utilized to explain the people variable in this study.

However, the theories were reviewed differently and the essence of combiningthem (DOI, TAM and TRA)in this study is because they inform the basis for the conceptual frame work of the research and this is further explained in Figure 3.1.

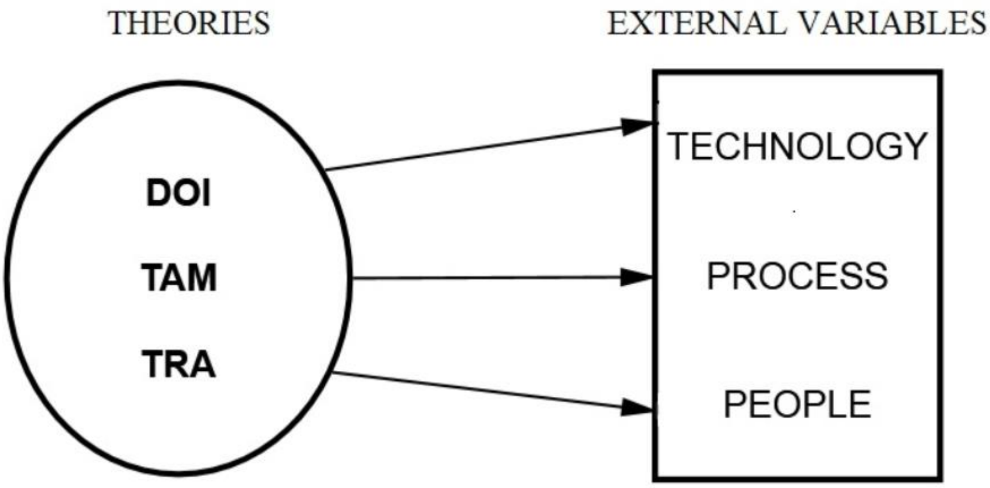


Figure 3.1: Theoretical framework

3.3 Conceptual Framework

According to Adrian (quoted in Kahiu, 2015), the primary function of a conceptual framework is to connect the researcher to the study. It expresses the researcher's ideological perspective based on assertion or disagreement with current discourse and topics. Conceptual framework is a legitimately created, depicted and expounded system of interrelationships among factors esteemed to be indispensable piece of the elements of the circumstance being researched (Chandran, 2004).

Development of approaches to improveelectronic-procurements implementation in the public sector requires detailed evaluation of existing practices. This will allow the issue to progress and encourage knowledge to develop in a clear and orderly way. The goal of this part is to clearly clarify the perspectives employed in this study and to make clear the researcher's position in relation to the present state of electronic-procurements in literature as a whole and in the public sector in Nigeria.A conceptual framework is therefore created to draw attention to concerns ofexternal variables (people, process and technology), benefits and barriers associated with these variables, the operational requirements which will ensure electronic-procurement implementation thereby ensuring effective contract administration in Nigeria’s public construction sector.Depending on the actions of the external variables, they can act either as drivers supportingelectronic-procurement or as barriers causing challenges to its embedment within the organisation. The actions which yield favourable results will be termed drivers and on the contrary those producing a negative effect will be termed as Barriers (Eadie *et al.*, 2010).

Figure 3.2 shows the input variables, framework process and the output of the framework which proffers solution to the research problem. The input variables are the external variables (people, Technology and process) which jointly have impact on the framework process which are benefits, drivers and barriers to electronic-procurements. It is also shown in the framework process that implementation of electronic-procurements is jointly influenced by the benefits of electronic-procurements while benefits and barriers jointly impact on the Operational requirements forelectronic-procurements.

Figure 3.2 further shows that proper implementation of the process has impact on effective contract administration while external variables is indirectly related to implementation of electronic-procurement. This will give an output of reduced cost, reduced time and curb corrupt practices.

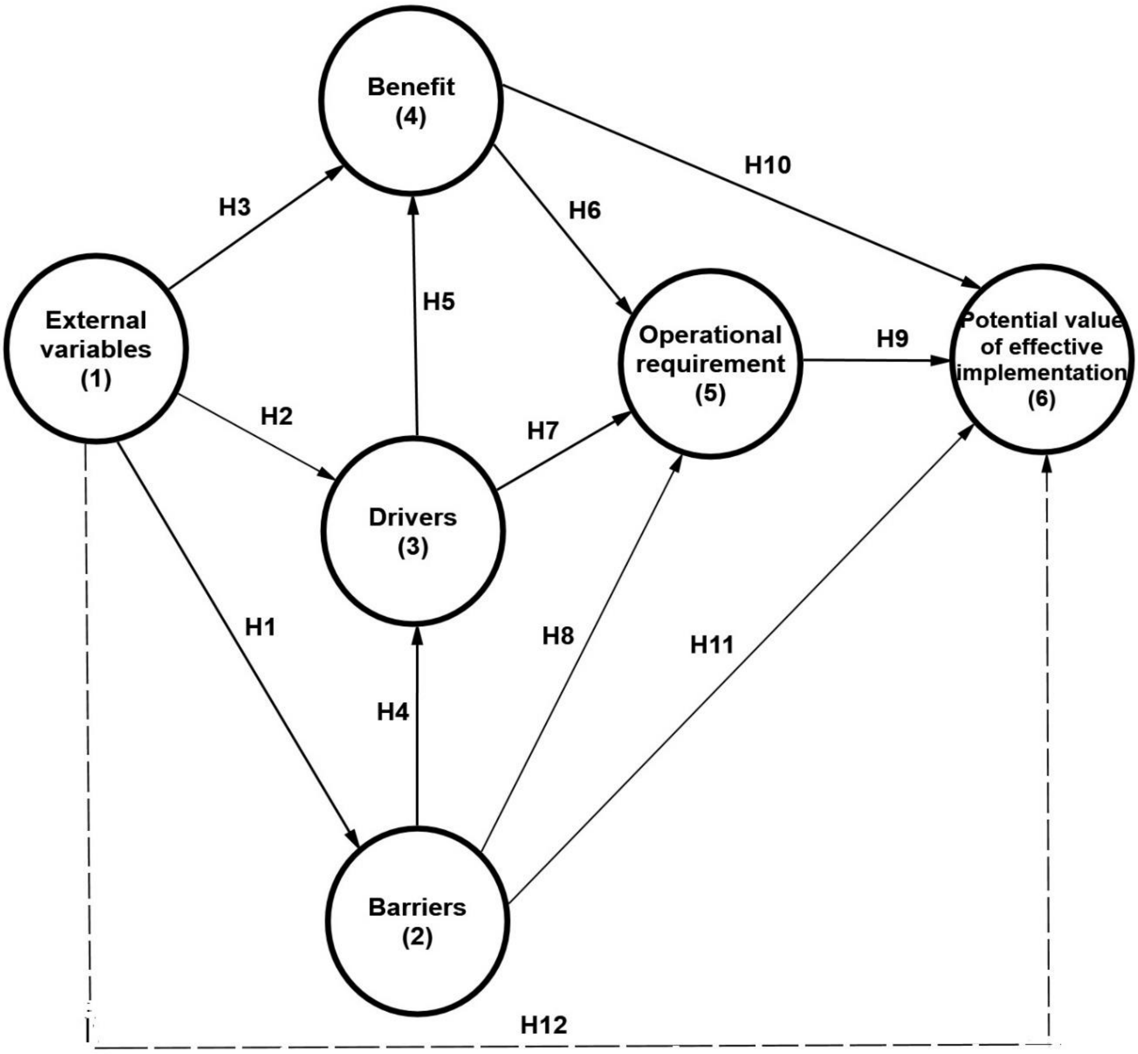


Figure 3.2: Conceptual Framework of the Research

3.4 Hypotheses Development

The theories that underpin the concept of technology models have been discussed in previous sections. This section provides theoretical context to support the study hypotheses.

The presence of barriers in the system determines success of electronic-procurement implementation. Recognizing the barriers is part of the primary management role in developing the best path for electronic-procurement deployment. This could stem from people, technology, process (Gunasekaran & Ngai, 2008).Barriers are those factors or events that inhibit the deployment of an electronic-procurements system and cause negative consequences, and they must be reduced if electronic-procurements is to be successfully implemented (Eadie *et al.,* 2007; Farzin & Nezhad, 2010; Doherty *et al.,* 2013).

When the negative effect of these variables (barriers) are countered, it gives room to the positive effects (Drivers) and these positive effect allows the benefits to be enjoyed and these benefits in turn has direct positive relationship with implementation of electronic-procurement, these benefits also have significant relationship withoperational requirement. Operational requirement further has positive effect on implementation which has positive effect on effective contract administration andwith effective contract administration there is reduced time and reduced cost.

3.4.1 Relationship between external variables and barriers, drivers and benefits to electronic-procurement

External variables in the context of this study will be referred to as technology' people and process

3.4.1.1 Technology

According to Agarwal *et al*.(2016); Castagnino *et al*.(2016); and Oke *et al*.(2018), the need to adopt technology in the delivery of construction services has been over stretched and this is because technology plays a vital role in the digital conversion of any organisation. The most essential factors that will determine if an organisation will go the digital route or otherwise are rooted in the technological and environmental dimensions (Eidhoff *et al.,* 2016). A company's technological orientation can be seen in its willingness to implement new technologies and its behaviour towards technological changes within its environment (Gatignon & Xuereb, 1997).

The implementation of digital technology creates an opportunity to realise worth for the organisation (Quinton *et al*., 2018). It was perceived that most organisation adopt these digital technologies so as to improve communication with customers and get the best out of suitable handling of their information, increase the competence of the organisation's processes, as well as achieve organisational growth in the process (Borges *et al.,* 2009; Harrigan *et al.,* 2011; Bhaskaran, 2013; Quinton *et al.,* 2018).

3.4.1.2 People

People champion every activity in the construction industry and are directed by some detailed culture within their organisation. Thus, the part of people in the digital revolution of construction organisations cannot be ignored if important changes in the area of digitalisation are to be achieved (Aghimien, 2020).

3.4.1.3 Process

Process is referred to as dynamic competence of any organisation as the structural and management processes which deal with the coordination of activities within the organisation in the search of delivering better product/services (Teece *et al*., 1997).

According to Liao *et al*. (2003), there are a few social and infrastructural barriers that impede electronic-procurement implementation. The factors mentioned included anabsence of technical human resources and general infrastructure required for an organization's smooth implementation of electronic-procurement. According to Eadie *et al.* (2007), barriers are conditions or circumstances that prohibit the implementation of an electronic-procurement system. It also refers to the elements that discourage the usage of electronic-procurement and cause poor outcomes (Farzin & Nezhad, 2010). In this study, barriers will be defined as those elements that limit the adoption and smooth deployment of electronic-procurement technology.

Despite the established benefits of employing electronic means in procurement, Wong and Sloan (2004) found that only forty eight percent of respondents could execute e-commerce efficiently. This demonstrates that there are obstacles to the introduction of electronic-procurements. According to McConnell (2009), the desire to adopt electronic-procurement has been stifled by technological impediments, which could be a reflection of the maturity of the electronic-procurement solution market or strategies used by employees within organizations to oppose change. A lack of technical brainpower to uphold and administer the organization's electronic-procurements system, including the necessary technological infrastructure and standards required to run the system, such as computers, a fast internet connection, and a network, are examples of technological impediments (Altayyar, 2017). In a study by Kangongo and Gakure

(2013), it was found out that incompatible technological design reduces the efficiency in procedures of theelectronic-procurementorganisation. However, technological challenge may derail adoption of electronic procurement in an organization (Inzofu, 2016)

McConnell (2009) identified the key process barriers as unwillingness to engineer process, supplier adoption, the expense of electronic-procurements systems, the complexity of goods and services procured, and the absence of procurements transparency are all factors to consider. It was further added by McConnell (2009) that there are people related barriers which are resistance to change and inappropriate organisational culture. It can be stated that if these external variables related barriers are curbed, it will give room to the drivers which in turn gives room to the benefits that can be derived from these external variables. Rankin*et al.*(2006), indicated that while literature addressing barriers surfaces more frequently, in circumstances where electronic-procurement solutions have been implemented, the focus shifts to drivers. Drivers are said to be the opposite of barriers and as a result of all the above, the following hypothesis were drawn for the study:

H1: There is a direct relationship between external variables (people, technology and process)and barriersto electronic-procurement.

H2: There is a direct relationship between external variables (people, technology and process) and drivers to electronic-procurement

H3: there is a direct relationship between external variables and benefits to electronic-procurement

3.4.2Relationship between barriers to implementation of electronic-procurement and drivers of electronic-procurement

A large number of barriers to the implementation of electronic-procurements have been highlighted in literature.Eadie *et al.* (2007) saw barriers as those things that prohibit the installation of an electronic-procurement system, whereas drivers are those processes or things that provide benefits as a result of the implementation of an electronic-procurement solution. Anumba andRuikar (2002); Grilo and Jardim-Goncalves (2011) asserted that construction procurementactivities are characterised as being relatively thorough, multifaceted, and occur at all the various stages of the project. These qualities could be viewed as hurdles to implementing IT in general, while also increasing the desire for more effective interoperability between businesses and pulling enterprises into IT applications (Grandon &Pearson, 2004). However, Doherty *et al* (2013) stated that obstacles (barriers) must be moderated if implementation of electronic-procurement must be actualized. Since drivers are the opposite of barriers (Rankin *et al.,* 2006) once barriers are mitigated, then, what is left is drivers to the implementation of electronic-procurement. These made it essential for the following hypothesis to be developed:

H4: there is a direct relationship between barriers to implementation of electronic-procurement and drivers of electronic-procurement

3.4.3 Relationship between drivers to implementation of electronic-procurement and benefits of electronic-procurement

According to Eadie *et al.* (2007), drivers are those processes or things that provide benefits as anoutcome of the installation of an electronic-procurements solution. According to Kahiu (2015), the impetus for implementation was based on benefits such as lesser purchase prices, cheaper transaction and process expenses and improved transaction speed. It was also stated that the deployment of electronic-procurement has created disagreement regarding some of the core concepts underlying public sector procurement, which may include lower bid victories. Among the several benefits of electronic-procurement is lower bid wins. Based on these findings, the following hypothesis was developed:

H5: there is direct relationship between drivers to implementation of electronic-procurement and benefits of electronic-procurement.

3.4.4 Relationship between benefits, drivers and barriers of electronic-procurement and operational requirements of electronic-procurement

Understanding how the benefits of electronic-procurements may be used to increase its implementation and develop a model for embedding electronic-procurements in construction requires identifying the drivers and barriers to electronic-procurements (Eadie, *et al.* 2010). The use of IT has resulted in better accessibility to service providers, effective task delivery, advanced process productivity and higher sector transparency(Dooley & Purchase, 2006; Gunasekaran & Ngai, 2008; Kottemann, 2009; Winkelhaus & Grose, 2020; Fatorachian & Kazemi, 2021); these could be seen as benefits.Electronic-procurements has been identified as a highly effective tool that is thought to increase performance by simplifying performance and lowering costs (Altayyar, 2017). Basri and Dominic (2010), established that an organization's readiness and its technical infrastructure (operational requirements) are critical determinants of the effective implementation of electronic-procurements.

Barriers to implementing electronic-procurement in construction, according to Aduwo *et al.* (2016), vary and include infrastructure, technology, socio-cultural, economic and legal difficulties, as well as other electronic-procurement system knowledge.Organisations use electronic-procurement because of the numerous benefits it provides: integration benefits tap search, supply quality enhancement, cost control and supply error elimination (European Union, 2012). The implementation of electronic-procurement technologies creates efficiency by allowing for less error in the transaction process and more competent purchasing (Singh& Punia, 2011). Many companies are seeking for novelmethods to reduce procuring costs, which are often the most expensive part of doing business (Da Vila *et al.,* 2003; Vaidya *et al.,* 2006).This led to the following hypotheses being developed:

H6: There is positive relationship between benefits of electronic-procurement and operational requirements of electronic-procurement

H7: there is positive relationship between drivers and operational requirements.

H8: There is positive relationship between barriers of electronic-procurement and operational requirements of electronic-procurement

3.4.5Relationship between operational requirements and potential value of effective implementation of e- procurement

Operational requirements takes a significant part in determining electronic-procurementimplementation. Companies are upgrading their IT infrastructure and restructuring their business processes in order to launch a digital initiative (Masudin *et al*., 2021). There will be a significant loss in productivity if an organization does not optimize the use of its IT infrastructure (operational requirements) (Singh& Punia, 2011).Operational requirement is capable of causing important changes in the markets. These changes may include lower firm overheads, improved service quality, faster product location and receipt and increased elasticity (Ali, 2014). The consumer's implementation of a new information system has a far-reaching and significant impact on public usage, as well as the introduction of a good system (Venkatesh *et al.*, 2003). According to Sharabati *et al.* (2015), end-user satisfaction and approval are critical to the success or failure of an IT system. According to Madzinga *et al.* (2020) when new technology is introduced into the workplace, the value of electronic-procurement is based on its implementation and is commonly used by professionals. Many suppliers, in particular and small firms in general, lack all of the necessary IT infrastructure (operational requirements) necessary and the resources needed to implement electronic-procurement systems (Singer, 2003).

From the above, it can be seen that there is a positive direct relationship between operational requirements and potential values of effective implementation and the following hypothesis was thereby developed:

H9: there is positive relationship between operational requirements and effective implementation

3.4.6 Relationship between benefits and effective implementation of electronic-procurement

In a study conducted by Ibem *et al.* (2015) the benefits of electronic-procurement were recognized as one of the elements that had the biggest influence on businesses' decision to implement electronic-procurement. According to Rankin *et al.*(2006); Eadie *et al.*(2011), the perceived benefits of electronic-procurement are the key reasons why most businesses in the construction industry employ it. According to Ibem *et al*. (2015), perceived benefits were at the top of the list of reasons that influenced the decision in other nations where electronic-procurements was implemented in construction.

Despite established benefits of using electronic-procurement, Wong and Sloan (2004) indicated that there were barriers to its implementation. However, according to Acher (cited in Asare and Prempeh, 2017), public sector organizations implement electronic-procurement to achieve benefits like improved transparency and reduced corruption. According to Moon (2005), implementing electronic-procurement allows organizations to simplify regulatory processes and reduce bureaucracy while promoting equity and transparency in government contracting and projects. Altayyar (2017) also demonstrated that the implementation of electronic-procurements and other e-business tools improves performance of firms and their partners. Implementing an electronic-procurement system will provide significant benefits to the administration. It is also another method for administration to reduce organizational costs while becoming more efficient in the procurement process (Altayyar, 2017). The following hypothesis was proposed based on the foregoing so as to establish a relationship between the benefits and implementation of electronic-procurement as highlighted in the framework:

H10:*There is a direct positive relationship between benefits and effective implementation of Electronic-procurement.*

3.4.7 Relationship between barriers and potential values of effective implementation of electronic-procurement

An organization can obtain a strategic advantage through electronic-procurement by enhancing client interactions as a result of higher business competence and improved information access and flexibility (possible benefits of electronic-procurement deployment) (Lederer *et al.*, 2001). In spite of the numerous advantages of electronic-procurement outlined by experts, the level of implementation in the European Union is lower than projected. This poor adoption rate can be attributed to a slew of hurdles to electronic-procurement implementation. Among the items on the list are: risk, supplier uncertainty, staff resistance to change, cultural difference and catalogue content preparedness (Sitar, 2011).

According to Sitar (2011), one factor for the smalllevel of acceptance may possibly be because Electronic-procurement implementation process is quite multifaceted and that the benefits of electronic-procurement can only become evident over time. Based on them, there is a link between the barriers and possible benefits of electronic-procurement deployment. The hypothesis that follows was thus stated.

H11: there is a positive direct relationship between barriers and potential values of effective implementation of electronic-procurement

3.4.8 Relationship between external variables and potential values of effective implementation of electronic-procurement

Makau (2014) determined that the introduction of electronic procurements in the public sector is hampered by constraints such as technological barriers and staff competence (people). Aduwo *et al.* (2016) provided a paradigm in which the constraints impeding the implementation of electronic-procurement by establishments in the Nigerian building sector are primarily internal factors, external factors, and the perception of risk factors associated with electronic-procurement use. According to the study's framework, there is a clear relation between impediments and people's perceptions of electronic-procurement and the amount to which it is implemented. According to Lou (2010), the organizational elements that determine the effectiveness of IT deployment are primarily people and processes, the enabling working environment, and the IT infrastructure. Based on these the hypothesis that follows was developed:

H12: There is an indirect relationship between the external variables and effective implementation of electronic-procurement

CHAPTER FOUR

4.0 RESEARCH METHODOLOGY

Rajasekar *et al.* (2013) termed methodology as describing the requirement of the procedure for data collecting and analysis necessary to solve a research problem.Research methodology defines a suitable process and procedure for achieving the research's basic goals. It is a science of learning how to perform research. Essentially, it's the procedure by which researchers describe, illustrate and forecast phenomena through their work. Its goal is to offer research work plan (Aghimien, 2020).The purpose of collecting scientific knowledge through research, according to Fendt *et al*. (2008), is to improve value to the system by assisting people with a better perspective of how to interact with others or in enhancing functioning conditions inside organizations.

This chapter gives an insight to the phases taken to accomplish the set objectives required for development of electronic-procurement implementation model for public sector construction projects in Abuja, Nigeria. This chapter provides detail on research philosophy, Research paradigm, research strategy and data collection instruments employed for the study.

4.1Research Philosophy

Philosophical statements are made by researchers concerning what knowledge is (ontology), how knowledge is known (epistemology), what values go into knowledge (axiology), how knowledge is written (approach), and how knowledge is studied (methodology) (Creswell, 2003). However, research philosophy refers to the whole of ontological, epistemological, and axiological assumptions and endeavours that impact a research (Pathirage *et al.*, 2008).

As asserted by Kagioglou *et al.* (2000), research philosophy is the foundation for knowledge development. Research procedures are often affected by knowledge bases founded on philosophical stances, from which the researcher can choose the framework and methodologies used (Creswell, 2009). This would pave the path for determining the best philosophical viewpoint for the investigation. Research philosophy refers to what a researcher does while conducting research since it considers the evolution and nature of knowledge (Collins, 2010).

4.1.1 Ontology

Ontology is concerned with the nature of reality, which produces assumption about how the world operates and how researchers perceive the world (Collins, 2010): This point of view might be viewed objectively (realistic) or subjectively (idealistic) (Saunders *et al.*, 2009; Collins, 2010). Subjectivism is grounded on the belief that social phenomena are formed by the perceptions, beliefs and subsequent activities of the social actors concerned with their existences, whereas objectivism is grounded on the belief that the existence of social entities is in certainty external to the social actors concerned with their existence.

4.1.2 Epistemology

Epistemology examines the link between the researcher and the subject of study; it could also be said that a positivist believes that only phenomena that can be observed and measured could be considered knowledge (Collis & Hussey, 2003). Epistemology is concerned with theories of knowledge that attempt to give solutionto concerns about the type of knowledge, its acquirement, and its constraints (Knight &Turnbull, 2008).

In another perspective, epistemology is apprehensive with what constitutes suitable knowledge in a given area of study (Saunders *et al.*, 2009). According to Johnson and Gill (2010), epistemology is the major emphasis in a research which educates the researcher about the assertion made about the phenomenon the researcher is involved in and whether or not it is justifiable. According to Vogt *et al.* (2012), epistemology is the study of the foundation and justification of knowledge and its claims.

Epistemology, on the other hand, determines the researcher's position in the improvement of knowledge. A researcher's foremost epistemological viewpoints include positivist and interpretivist. Positivism is grounded on the premise that only observable phenomena could lead to acceptable evidence that is gathered using assumptions which are derived from current theory. The positivist researcher is concerned with facts and believes that research should be conducted in a value-free manner in which none of the subject of the investigation nor the researcher influence oneanother. The interpretivist school of thought calls for the researcher to grasp the differences between humans in their title role as social actors. The interpretivist researcher, equipped with belief that the universe is subjective and socially produced, energetically participates in the study (Saunders *et al*., 2009).

4.1.3 Axiology

The study of value judgments is the focus of this field of philosophy. It may include aesthetic and ethical values (Collis & Hussey, 2003; Mertens, 2007; Saunders *et al.*, 2009; Collins, 2010), however the key focus of axiology as a division of philosophy is the way of social inquiry and the function that the researcher’s values play throughout the research process (Saunders *et al.,* 2009). It covers any ethical quandaries that may occur during the investigation (Collins, 2010).Positivists have the believe that they are not a part of what is being researched, that they are not tied to what is being researched and that the process is therefore value-free. Phenomenologists believe that even if their values are not expressed, researchers have them. These beliefs help to decide what is recognized as truth and the interpretations that emerge therein (Collis & Hussey, 2003).

4.1.4 Philosophical stance of the study

This study followed the positivist idea, which holds that human conduct could be examined insimilar way as natural sciences are (Collis & Hussey, 2003). The positivistic methodology is critical for measuring and evaluating various occurrences and providing legitimacy. Positivism is appropriate for this study since there is need to examine people's attitudes on electronic-procurement and their trust in technology for effective contract management. Based on this, the various philosophical perspectives are as follows:

The assumption that the reality of social entities is outsidethe social players concerned with their existence underpins an ontological objective view. Knowledge is objective in the sense that it is independent of any single person's perception. Thus, knowledge exists outside of any single human and is distinct from them (Creswell & Miller, 2000). The positivist epistemological view, which is apprehensive with facts and believes that study should be conducted in a value-free manner in which none of the subject of the research nor the researcher influences one another, and the positivist axiological philosophical view, which believes that they are do not form part of what they are researching, that is, they do not attach to what they are researching. Hence the process is value-free. In conclusion, this research takes a positivism stance as earlier stated.

4.2 Research Paradigm

According to Saidu (2016), paradigms are the basis of not just theoretical ideas but also ontological and epistemological assumptions. It was also mentioned that a paradigm is a fundamental direction to theory and study. Paradigms have been scientifically defined as a whole system of thought that includes the fundamental assumptions, essential questions to be answered or puzzles to be solved, research methodologies to be applied, and samples of what successful scientific study looks like (Saidu, 2016).

The pragmatic paradigm approach (mixed method) was chosen centring on the philosophical stance (ontological and epistemological assumptions) of this research since it allows for the use of multiple data sources and techniques of analysis, increasing the dependability of the study findings. Many researchers, however, have claimed that pragmatism is the ideal paradigm for supporting the use of mixed method research (Tajudeen, 2014). According to Creswell (2003), using mixed methods approach allows the researcher to acquire creative abilities in research design, data gathering, and data analysis. This is grounded on research knowledge gained via the application of various research approaches.In these researches, knowledge is defined as an external "out there" perspective and an individual perspective. In an attempt to build some comprehension of knowledge founded on objective and subjective stances, the researcher accords both credibility. The researcher begins with an issue that needs to be resolved and then uses the tools accessible to him or her to understand it. Furthermore, the researcher perceives knowledge pragmatically as being founded on the investigation of problems or issues through the use of various research procedures (Creswell *et. al.*, 1996). Table 4.1 compares the four research paradigms in terms of their philosophical basis. The pragmatic paradigm is explained since it is thought to be the best fit for this study due to its capacity to mix both qualitative and quantitative data.

4.3 Pragmatism

Pragmatism refers to a philosophy of science that emphasizes link between truth and action and says that the willingness to act on ideas is the decisive proof of them. Pragmatism emphasizes the mutual integration of action and knowledge; that is, it integrates action and knowledge devoid of portraying them as mutually exclusive (Fendt *et al*., 2008). Pragmatic approach emphasises on addressing demanding present issues in order to develop constructive knowledge, which is subsequently translated in form of action (Fendt *et al.,* 2008).Pragmatism is an intriguing, transparent, and functional framework for a research that deviates from truth and reality, sparking paradigmatic arguments across time. Pragmatism urges academics to pursue what is pleasing and desirable, to examine these concerns in such a way that they understand and to apply the findings to produce good outcomes within the value system under examination (Tashakkori & Teddlie, 1998). Pragmatism is commonly acknowledged as the philosophical footing for the mixed methods approach. Pragmatists believe that positivist and constructivist philosophical perspectives can coexist harmoniously (Denscombe, 2008; Teddlie & Tashakkori, 2011).According to Tashakkori and Teddlie (1998), researchers should employ any method that will shed some light on the subject being studied; numerous ways are advantageous. As anoutcome, pragmatism serves as the conceptual foundation for mixed methods research. Pragmatism, asserted by Cresswell (2003), offers a foundation for knowledge and possesses what followsas features:

Pragmatism is not tied to any philosophy or reality system, and individual scholars have the freedom to pursue their own interests. There is "freedom" to select the study methodologies, strategies, and techniques that best match their desires and objectives.

Pragmatists do not view the world as a whole. Similarly, mixed methods researchers consider a variety of ways to data collection and analysis rather than adhering to a single method.

Truth is whatever works at the moment: it is neither founded on a precise dualism of thought and reality, nor is it wholly independent of the mind. In mixed methods study, researchers employ both quantitative and qualitative data to provide the greatest knowledge of a research problem.

Pragmatist researchers consider the "what" and "how" of research in terms of its envisioned outcomes. Mixed methods researchers must have a reason for "mixing," or a reason for combining quantitative and qualitative data.

Pragmatists have agreed that research takes place in a variety of social, historical, political, and other circumstances. Mixed methods researches may thus incorporate a postmodern turn, a theoretical lens supportive of social justice and political goals.

Pragmatists argue that there should be a cease in asking questions about reality and natural rules.

Table 4.1 gives the comparison among four branches of research paradigms

Table 4.1: Comparison of Four Branches of Research paradigms

	Positivism	Realism	Interpretivism	Pragmatism
Ontology: the researcher'sview of the nature ofreality or being	External,objective and independent ofsocial actors	Is objective. Exists independently of human thoughts and knowledge of their existence (realist), but is interpreted through social conditioning(critical realist)	Socially constructed, may change, multiple	External multiple, view chosen to best enable answering of research question
Epistemology: the researcher'sview of whatconstitutes acceptable knowledge	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or Contexts		Subjective Meanings on social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology: the researcher'sview of the role of values in research	Research undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative but can use qualitative	Methods chosen must fit the subject matter, quantitative or Qualitativ	Small samples, indepth investigations, qualitative	Mixed or multiple methods designs, quantitative and Qualitative

Source: Saunders *et al.* (2009)

4.4 Research Strategy

Since the study tends towards the pragmatic approach, there are six mixed research strategies that the researcher can choose from. They include: survey; case study; grounded theory; ethnography; archival research strategies, sequential mixed method and concurrent mixed method (Creswell, 2009; Saunders *et al.*, 2009). This study adopted asequential exploratory mixed studyapproach.

The sequential exploratory mixed research approach was hence embraced for this research. In sequential mixed method the research approach begins with a qualitative method and follows up with a quantitative survey method (Saunders *et al*., 2009). In this research, the Delphi survey which is qualitative in nature was first carried out, the results from the Delphi analysis shaped the foundation for the final survey which was quantitative in nature. The sequential exploratory approach was chosen over triangulation and other approaches because of the need for experts input in the Delphi.

4.5 Research Approach

According to Amaratunga *et al*. (2002), there is no ideal approach for conducting research; it simply is a matter of meeting halfway. This is due to the fact that each approach has in-builtbenefits and drawbacks, and the approach adopted in each study is influenced by the nature of the subject to be resolved, the sort of data used, and the deductions to be drawn (Oyewobi, 2014). Thus, the following research approaches were explored.

4.5.1 Qualitative approach

According to Adejimi *et al.* (2010), qualitative research seeks to learn about the phenomenon at hand through the use of a "less structured" methodology in order to obtain richer and deeper knowledge. Inductive researchers, rather than forming a hypothesis, aim to keep their thoughts open to any conceivable outcomes (no pre-supposition). Furthermore, qualitative technique emphasizes the characteristics of the phenomena under investigation rather than their numerical measurement. The gathering, analysis, and interpretation of data based on what individuals do and say is known as qualitative research. It relates to the meanings, conceptions, definitions, qualities, metaphors, symbols, and descriptions of many objects. Qualitative research is far more subjective and uses a variety of data collection methods, the most common of which are individual, in-depth interviews and focus groups. This style of study is exploratory and unstructured. A limited number of persons are interviewed in depth, and/or a small number of focus groups are held (Anderson, 2006). According to Castro *et al.* (2010), the strengths of this method include: accuracy in operationalizing and measuring specific constructs, group comparison, and model formulation and testing in research.

The disadvantages of this approach, as asserted by Johnson and Onwuegbuzie (2004) and Castro *et al.* (2010), are the point of entrance in showing its uniqueness, measurement is divorced from the real world, and it is problematic to produce quantitative forecasts.

4.5.2 Quantitative approach

Measurement in quantitative research must be objective, quantitative, and statistically valid. Simply put, it is all about numbers, hard data. A survey's sample size is calculated using formulas to determine how large a sample size will be needed from a given population to achieve findings of an acceptable degree of accuracy. In general, researchers seek sample sizes that yield findings with at least a 95% confidence interval (meaning that if the survey is repeated 100 times, the same response will be obtained 95 times out of 100), plus/minus a margin of error of 5 percentage points (Anderson, 2006).According to Castro *et al.* (2010), this approach has the following advantages: The ability to generate comprehensive accounts of human experiences is likely, the accounts are in the context of the observations, an in-depth analysis is likely in a way that measurement scales will not be able to capture, and the restraint of this approach, as stated by Castro *et al.* (2010), is the capacity to draw robust conclusions.

Summarily, Anderson (2006) opined that Quantitative research seeks explanatory laws, whereas qualitative research seeks detailed description. Qualitative research aims to create universal laws by measuring what it perceives to be a static reality. The goal of qualitative research is to look into what is assumed to be a changing reality. Although it does not claim that what is discovered in the process is universal and thus replicable, quantitative analysis is regarded as a necessary tool for intelligent logistics decision-making in situations such as comparing a design to an industry standard, evaluating specified alternatives and generating configuration with respect to a given performance measure (Ghiani *et al*., 2004).Furthermore, qualitative research produces rich, detailed, and valid (process) data that contributes to a comprehensive understanding of the context. Because quantitative research produces reliable population-based and generalizable data, it is ideal for establishing cause-and-effect relationships. The decision between quantitative and qualitative designs is philosophical. The nature of the project, nature of information required, context of study, and resources available (time, money, and human) will all influence which methods are used (Monfared & Derakhshan, 2015).

4.5.3 Mixed methodapproach

This methodology arose as a result of deficiencies discovered in either qualitative or quantitative methodology when employedonly (Hesse-Biber & Leavy, 2010). Johnson and Onwuegbuzie (2004) defined mixed methods research as type of research in which the researcher puts together quantitative and qualitative research methods, approaches, concepts, or language into a study to increase the breadth and depth of understanding.

Johnson and Onwuegbuzie (2004) highlighted the following strengths of this approach: The greatest strength is its capability to combine the strengths of both qualitative and quantitative approaches, thereby reducing their weaknesses; various types of research questions can be enquired because it is not narrowed to one approach; written evidence can be used to support measurements and vice versa; the results of one approach can serve as the foundation for the beginning of another method and vice versa;the deductions made may be improved because the results of one aspect may supplement or corroborate the other aspect, the quantitative aspect of the study may be used to intensify the generalizability of the study, and the whole study may be improved because the likelihood of omission is lesser when multiple methods are used as opposed to a single method. As previously stated and explained, the mixed method methodology (pragmatic) was used for this research.

4.6 Sampling Technique and Sampling Size

Sampling is the statistical method of selecting a subset of an interest population (referred to as a sample) in order to make observations and statistical inferences about that population. Because of feasibility and cost constraints, researchers cannot study entire populations; therefore, they must select a representative sample from the population of concern for observation and analysis. It is critical to select a sample that is truly representative of the population so that sample's inferences can be applied to the population of interest (Bhattacherjee, 2012).

During the Delphi survey, it was found out that some of the Federal Government parastatals and ministries do not have construction professionals in them (Ministry of foreign affairs, accountant general’s office are inclusive). Based on this fact, non-probability and probability sampling methods were both employed. The Delphi survey used the purposive sampling method (a type of non-probability sampling), while the Questionnaire survey used the simple random sampling method (a type of probability sampling).

Each unit in the population has no chance of being chosen in a non-probability type of sampling. Sampling could also be seen as where the researcher selects at random certain cases that will, in all probability, yield the information that is required (Eke, 2017). Purposive sampling is a judgemental sample that is chosen based on the researcher's familiarity of the people concerned who are ready to give adequate information on the topic (Bernard, 2002) and this was used for the Delphi and also to select MDAs (those MDAs with professionals in them) which included Ministry of works and Housing, Ministry of environment, Federal Capital Development Authority (FCDA), Federal Housing Authority (FHA), Bureau of Public Procurement (BPP), Standard Organisation of Nigeria (SON), Central Bank of Nigeria (CBN), Nigerian National petroleum corporation (NNPC), Nigerian Airforce (NAF), Development Control, Federal Capital Territory Authority (FCTA), Federal inland revenue service (FIRS) and Satellite Towns Development Authority (STDA) were sampled.

Probability sampling is a technique in which each unit in the population has a chance (non-zero probability) of being chosen in the sample, and the chance can be precisely calculated (Bhattacherjee, 2012).To select respondents (population) in the selected MDAs and parastatals that filled out the Questionnaire on behalf of the organizations, a simple random type of probability sampling was made use of. Population in research is referred to as the total number of cases or elements that one can examine (Etikan, 2016). The sample size is an important feature for drawing conclusions about a population from a sample.The sample size for the study was thus determined using the formula for simple random sampling for an undefined population In the equation (1) below, use the

Cochran formula developed by Cochran (1963, cited in Afolabi *et al*, 2019). Where p = 0.5, indicating the maximum variability at 95% confidence. Because the researcher does not know the inconsistency in the proportion of the real number of internal stakeholders in MDAs and parastatals, value of 95% is used. In Equation (1), e is the desired level of accuracy for the sample size, which is 5%, z is the normal curve's abscissa, which is 1.96, and q is represented by (1 p), which is equivalent to 0.5. As a result, 385 internal stakeholders were determined to be the minimum sample size.

Minimum Sample size, $n_0 = \frac{z^2pq}{e^2}$

$$Equation\ 1$$

Based on this, a total number of 400 questionnaire was thereby administered among the internal stakeholders in all the MDAs sampled.

4.7 Data Collection Instruments

According to Xie (2002), there are four major methodological approaches to investigating team interaction: experimental direct observation and naturalistic direct observation, research interview, research questionnaire, and documentary evidence. Instead, the Delphi survey, which is qualitative in nature, and the questionnaire were made use of to collect data in this research. The Delphi was conducted among selected panellists, while the questionnaire was distributed to the MDAs in order to obtain quantitative data.

4.7.1 The delphi survey

Delphi surveys are a high level formalmethod of communication designed to elicit most unbiased information from a panel of experts (Chan *et al.,* 2001). The Delphi survey is another process that involves experts responding to designed non-leading definite statements in order to reach consensus (Holey *et al*., 2007). The Delphi surveys entail the development of appropriate procedures for appropriate experts, the development of appropriate questions to ask them, and the analysis of their responses. (Outhred, 2001; Cabanis, 2001). The method is typically carried out through remote correspondence, such as mailed questionnaires and e-mail, rather than in-person group participants responding individually, which lessens the influence of group dynamics on the resultant consensus. (Manoliadis *et al.*, 2006).

This method is based on expertise of chosen experts and does not depend onearlier historical data. Furthermore, instead of producing a quantifiable measure or result, the method is typically intended to provide a judgement or opinion on the specific subject matter. As a result, the method can easily work well in new areas where forces are frequently unpredictable and not always easily quantifiable(Manoliadis *et al.*, 2006).

As a result, the Delphi survey was used in this research to determine the most important factors in implementing electronic-procurement in Abuja's public construction sector. This will help to address the issue of subjectivity in determining the most important factors.

4.7.1.1 Format of delphi survey

The Delphi survey yields both qualitative and quantitative results, as well as exploratory, predictive, and even normative elements (Cuhls, 2003). The technique requires experts who are knowledgeable in the area of study. It thereby removes bias due to the fact that the panellists do not know each other during the exercise. The method is said to be useful for long-term forecasting, especially since the only information available is expert opinion (Eke, 2017). Rowe and Wright (1999) stated that Delphi is not a process intended to challenge general human judgement which has been shown to be inferior in statistical or statistical modelling approacheswhich are neither practical nor feasible. This is due to a lack of suitable technical, historical and economic data necessitating some form of human judgment (Rowe & Wright 1999). Such input must be used as efficiently as possible, and the Delphi technique may be useful in this regard.

According to Eke (2017),Delphi is an iterative process that consists of 3 to 4 rounds of questionnaires, each of which builds on the outcomes of the previous one. Panellists can re-evaluate their responses in light of the aggregated responses of all panellists after several successful iterations. The anonymity of the panellists enhances the probability that options are considered in and of themselves without being influenced by the person who expressed the opinions (Eke, 2017) since the panellists are not known to one another but are known to the researcher.

The key issues in preparing a Delphi survey, according to Manoliadis *et al*. (2006), are the definition of experts and their selection, the number of rounds, and the questionnaire structure (number of questions) in each study round. Loo (2002) had it that there are five major characteristics of the Delphi process. The main concepts which are listed as follows:

1. Panel of carefully selected experts representing a wide range of opinion on the subject or issue being surveyed should conduct the study.

2. Most participants are anonymous.

3. Throughout Delphi process, researcher creates structured questionnaire and feedback reports for the panel.

4. It is an iterative process with 3 to 4 "rounds" of questionnaires and feedback reports.

5. An outcome, usually in the form of a research report containing the Delphi results, forecasts, and policy and program options.Delphi guidelines as suggested by Hasson *et al.* (2000) takes care of the following Delphi study technique:

Research problem identification: Hasson *et al.* (2000)established four objectives that ask for the use of the Delphi technique, amongst it was to relate informed judgments on a subject that spans a wide variety of disciplines.

Understanding the process: The process is the same for each type of Delphi, but the purpose of the study determines which type of Delphi is used. The Delphi technique is a multi-stage process for gathering ideas and reaching group consensus (McKenna, 1994). The procedure is as follows:

A small group was used for pilot testing.

Initial questionnaire (qualitative feedback sought) (not in all cases)

Initial reactions (quantitative after statistical analysis of the initial opinions)

Subsequent questionnaire (again, qualitative comments sought) (not in all cases)

Following statistical analysis, follow-up feedback will be quantitative. This gives participants the opportunity to change their minds. (McKenna, 1994).

Selection of the experts:according toMcKenna (1994),in the experts' selection, it is of importance selecting panel members who have interests in the subject. It is also important to select persons who have vast knowledge of the subject in question as well as willing to participate in the several rounds of questions on the same subject. For this study, the consent form was used in the first round of Delphi survey to accomplish this.

Invitation of experts:It is critical to explain to those who will be invited what is expected of them, how much of their time will be required, what they will be required to provide, the purpose of the study, and what will be done with the information provided. This is to enable them make up their minds to be dedicated to the end of the study (McKenna, 1994). For this study, this was taken care of in the introduction letter attached to the questionnaire.

Data Analysis: researchers need to apply appropriate analysis techniques. However, whatever technique is used, the process should be halted when data stability occurs (Crisp, *et al*., 1997). The measures for qualitative studies such as the delphi survey as stated by Eke(2017), should be credibility (truthfulness), applicability (fittingness), consistency and confirmatory capacity.

Presentation and interpretation: different methods displaying the data from a Delphi survey exists ranging from graphical to statistical (McKenna, 1994). In this study, the statistical was used.

4.7.1.2 Selection of expert panel

According to Chan*et al.* (2001), the success of Delphi surveywholly dependson careful selection of panel members.Andranovich (1995) stated that ten to fifteen panel experts will suffice if the group of experts is fairly homogeneous. This was agreed upon by Ziglio (1996)which stated that 10 to 15 people yield good results when they are sharing similar opinions (homogenous panel)and the panel should be constituted based on the peculiarities of the research such as the number of experts available, the desired geographical illustration and also capacity of the facilitator. However, Adnan and Mortledge (2003) asserted that the number of participants ranges from 3 to 15.Delphi survey is time consuming owing to the fact that many rounds are involved; there are no established number of panel experts that should be involved in a Delphi Survey and the number could vary between three and fifteen. Based on these, this study adopted a panel of twelve experts. The experts were a group of experienced professionals in construction procurement they were selected based on the fact that information needed requires adequate knowledge and good experience in procurement activities. The under listed criteriawereemployed in thechoice of the experts.

Criteria 1: Procurement officers in MDAs directly involved in construction procurement for the public sector (FCDA, FHA, Federal Ministry of Works and Housing).

Criteria 2: Procurement officers having experience of 5years and above in public sector construction procurement selection process.

Criteria 3: Procurement officers with at least a university degree.

4.7.1.3 The number of rounds

Various researchers have different perspective to the amount of rounds a Delphi questionnaire should circulate. Woudenberg (1991) recommended between two and ten rounds while Adnan and Mortledge (2003) however suggested that the number of rounds should range between 2 to 7. The Delphi survey in this research made use of 3 rounds with the aim of establishing factors relating to electronic-procurement that are peculiar to the Nigerian public construction sector. This was because, at the completion of the third round when the responses in round two and three were compared, the responses were similar and consensus was said to have been reached.

The questionnaire for the first round of the Delphi survey was established from literature and was designed in a way that the experts would rate factors that are peculiar to their organisations. The experts rated the factors put before them, the questionnaire was then analysed and some factors were dropped based on the decision rule that was set. A new questionnaire was then drawn removing those factors. The second round of questionnaire was then sent back to the experts to give them the opportunity of rating the available factors.When the responses gotten from the second round were analysed, same questionnaire used in round two was sent back again to the panel alongside the result of round two analysis as round three to give them room to review their responses if need be so that a consensus could be reached.Figure 4.1 is a description of the Delphi survey.

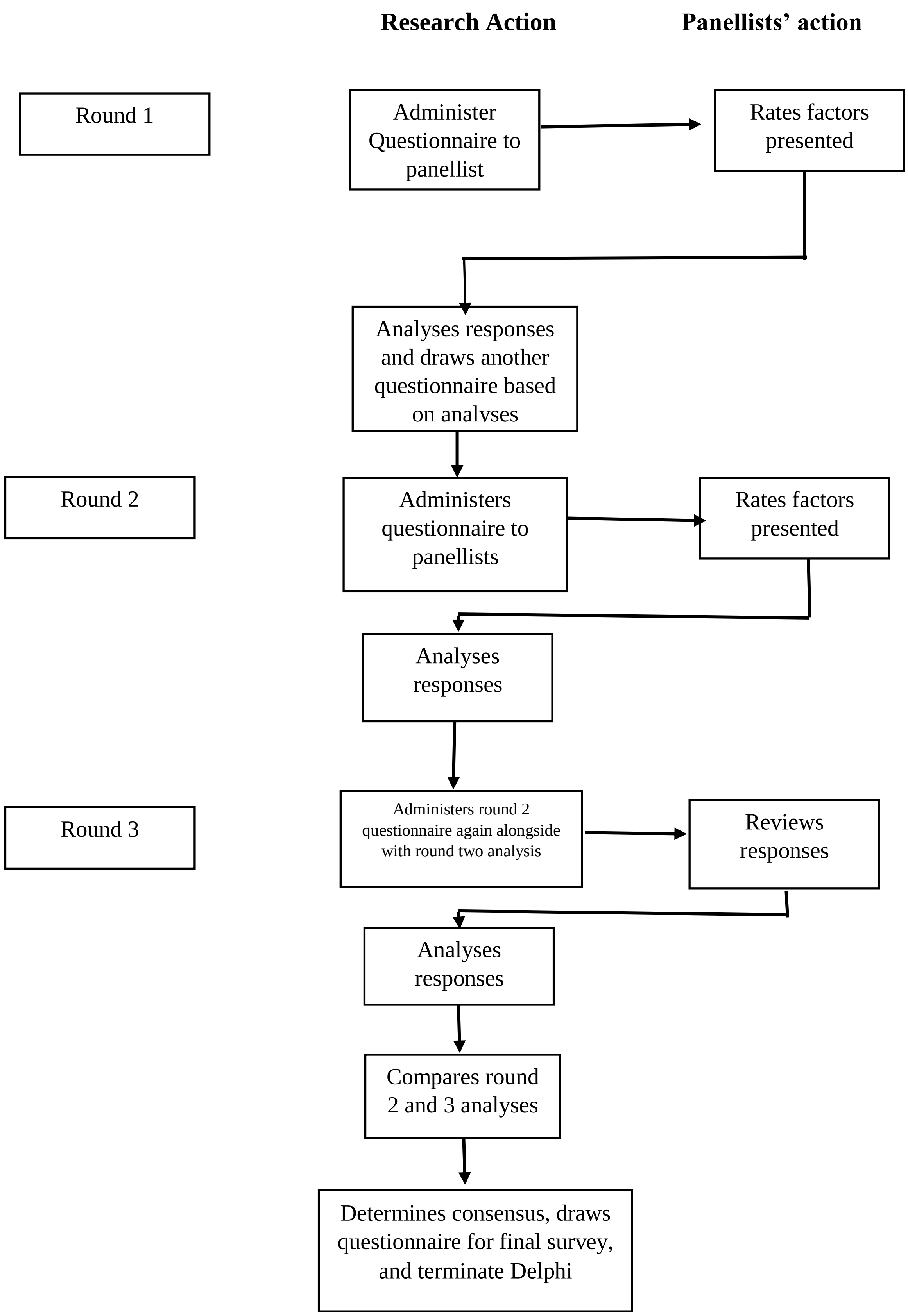


Figure 4.1 Illustration of the Delphi Process

4.7.1.4Reason for delphi survey

From literature, it was stated earlier that there is vast research on electronic-procurement implementation in the private segment while very little of research exists in the public sector; aside the studies of Oyediran and Akintola (2011) and Afolabi *et al.* (2019), which concentrated on the Nigerian construction industry entirety, the other published works on electronic-procurement in Nigeria are on the building industry, which is a subset of the construction sector.Studies likeEadie *et al*. (2010) used a full Delphi approach to make sure that drivers and barriers recognized from general electronic-procurement studies could also be applied to the construction industry. Grounded on this, the Delphi method was chosen to enable the following factors to be established as it affects the Nigerian public construction sector since same factors could apply also to other sectors in general (including manufacturing, retail, and supply).

1. To establish the most important external variable factors that have impact on implementation of electronic-procurement in the Nigerian public construction sector.
2. To establish the driver factors of implementation of electronic-procurement in the Nigerian public construction sector.
3. To establish those factors that are significant barriers to electronic-procurement implementation in the Nigerian public construction sector.
4. To establish those factors that are most important operational requirements for electronic-procurement implementation in the Nigerian public construction sector.
5. To establish those factors that are of most important potential values that will be derived if electronic-procurement is implemented in the Nigerian public construction sector.

By establishing all these factors, factors which were not applicable to the Nigerian public construction sectorwereeliminated. In lieu of these a questionnaire was drawn for the first round of the survey. This questionnaire was filled by experts who fitted the criteria for selection. A round two of the survey arose from the analysis of the round one and a third round of the survey was done through administering the second round questionnaire alongside its analysis to give room for a review.

After analysing the third round, similar responses to the second round was achieved. Thus, a consensus was said to have been reached at the completion of the third round and the final survey questionnaire arose.

4.7.2 The Questionnaire

Questionnaires are among the most common methods of social research. The idea of formulating precise written questions for those whose opinions or experiences you are interested in appears to be such an obvious strategy for obtaining answers to issues that interest one (Blaxter, 2006). According to Bhattacherjee (2012), a questionnaire is a research instrument that consists of a series of questions (items) designed to elicit standardized responses from respondents. Unstructured or structured questions are acceptable. Structured questions require respondents to choose an answer from a predefined set of options, whereas unstructured questions require respondents to respond in their own words. Individual structured questionnaire questions (items) can be aggregated into a composite scale or index for statistical analysis.

According to Oppenheim (1992), a questionnaire survey can be used to confirm the findings of a literature review by providing a current status picture, either in terms of the frequency or prevalence of specific attributes and variables, or the relationship between them.

Questionnaires can be distributed using a variety of different methods. They can be mailed to their intended recipients, who must then complete and return them (preferably, if response is required using a reply-paid envelope). They can be administered over the phone or in person, with the latter resembling a well-structured interview. They can be sent via the Internet. Each of these techniques has benefits and drawbacks. Face-to-face surveys get more responses, but they take more time from the researcher. Postal and email surveys are more likely to receive fewer responses and possibly poorer answers because the respondent does not have anyone available to answer any questions; however, they may allow a greater number of people to be surveyed (Blaxter *et al.,* 2006).

This study used a well-structured close-ended questionnaire, the factors of which were determined through a thorough literature review. The questionnaire was then administered face to face, which took longer but resulted in a higher response rate, with respondents selecting answers from a predetermined set of options.

4.7.3 The final survey

The analysis of the third round of the Delphi survey was the basis for the final survey; same questions were asked in same pattern.Even though it was time consuming, the questionnaire was administered face to face, which has the advantage of obtaining a higher response rate (Blaxter *et al.*, 2006).

4.7.3.1 Data collection

The administration started in February, 2020 and was supposed to have been completed by the end of March, 2020. This target was however not achievable due to the coronavirus pandemic which caused restriction in movements. A total lockdown order was given by the federal government of Nigeria for the whole month of April, 2020. The lockdown was however eased on 5th May, 2020 but interstate movement was still restricted and this did not allow questionnaire to be retrieved within that period; thereby prolonging the data collection phase.

On the 1st of July, 2020, the restriction on interstate was lifted thereby giving room for travels. In the process of retrieving the questionnaire administered, some respondents could not find the filled questionnaire due to the long period of lockdown. Another set of questionnaire was administered in such places. In general, an additional period of two weeks was given again to complete the data collection phase. This period elapsed on the 14th of July, 2020. A total number of 146 (approximately 37 %) questionnaire among the retrieved were well filled and in order for further analysis.

4.8 Reliability and Validity of the Methods

The precision with which an instrument/device (for example, a questionnaire) measures what it is supposed to measure is referred to as reliability and validity (Bryman & Bell, 2007). Piloting is the process of testing research techniques and methods to see how well they work practically and if necessary, modifying your policies accordingly (Blaxter, *et al.,* 2006). The significance of pilot research cannot be overemphasized. In other words, to ensure an instrument is valid and reliable, it has to be piloted. In achieving this in this study, the supervisory committee had a thorough look through of the research instrument to ensure that all objectives were adequately captured, all factors identified from literature are tested to ensure applicability in the Nigerian public construction industry and to also ensure the instrumentwas efficient for the purpose and where it was thought to be inefficient, corrections were made to make sureof efficiency before proceeding for the Delphi survey.

Since a Delphi was involved in the study, this served as a validity testing and thus took the place of a pilot study. Each round of the Delphi comprised of a twelve number panellists as earlier stated. The panellists involved in the Delphi also partook in the final survey of the study. The Delphi survey helped in filtering the factors to establish those applicable to the public construction sector thereby reducing the bulkiness of the questionnaire.

Hasson *et al.* (2000 cited in Aghimien, 2020) stated that the degree to which a procedure consistently produces alike results under consistent situations is referred to as its reliability (in this study, same questionnaire being administered twice to same set of people is the consistent condition). In this study, reliability was ensured, absolute care was taken to ensure that credibility was demonstrated through truthfulness and response consistency and conformability was exhibited amongst panellists. During the panel's selection, absolute credibility was also ensured.

All panellists had met the set criteria and had vast knowledge of the study area as presented earlier in 4.5.2.3. Reliability according to Hasson *et al*. (2000 cited in Aghimien, 2020) has to do with how dependable the results are. The panellists' credibility was one criteria to ensure reliability to further strengthen the internal validity, the experts on the panel were given the opportunity to change their minds or uphold their view since the Delphi study was conducted in three rounds.

The external validity of the research was not animportant factor in the Delphi study since the study's results were going to be authenticated using the field questionnaire survey method. As previously stated, the panellists were members with vast knowledge in electronic-procurement in construction from various ministry and parastatals of the Federal Government of Nigeria which are involved in construction procurement. It will therefore be stated clearly here that external validity requirements for the study was fulfilled by ensuring that all panellists were highly experienced with between 5-16 years' experience (Table 5.1).

The researcher's mixed approach method is believed to be the most tenable technique for guaranteeing questionnaire validity (Pansissircited in Altayyar, 2017). Numerous procedures can be utilized to guarantee the questionnaire's validity and reliability e.g. surveying the inquiries from at least two research specialists to decide ifthey measure what should be measured (Ruane, 2011).

Foddy (1994) expressed that the reliability and validity of the data gathered are determined by the structure and design of the questionnaire, as well as if pilot testing was completed prior to the real data gathering and testing. Pilot testing would identify any irregularities or flaws that can be overcome in genuine data gathering and testing. It was stated that consistency of responses and data gathered is critical in this type of study.

Foddy (1994) defined consistency as the question being understood in the way anticipated by the researcher and the respondent's answer being understood by the researcher in the way envisioned by the respondent.

It was further made clear by Foddy (1994) that if a questionnaire passes through all of the stages, it is considered valid and reliable. shown in Figure 4.2:

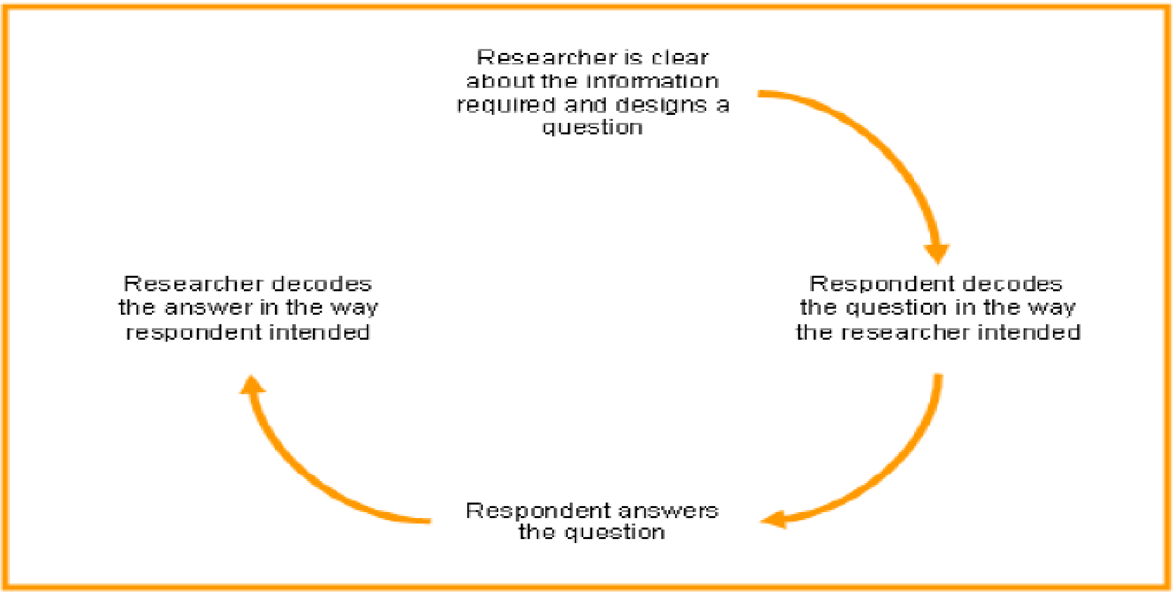


Figure 4.2: Steps to Develop a Comprehensive Questionnaire (adopted from Alfaadhel, 2010)

4.9Method of Data Analysis

4.9.1 Delphi survey analysis

The panellists were asked to rate the constructs on a 5 point Likert scale where 1 stood to be the lowest and 5 the highest. All responses obtained from the Delphi rounds were entered into Microsoft excel 2013 and then transferred to statistical package for social sciences (SPSS) version 23. The mean item score, standard deviation, Cronbach Alpha value were established using SPSS while the means were ranked manually.

The Cronbach's Alpha is a measure of internal consistency, or how closely related a group of item is. It is regarded as a scale reliability metric (Pallant, 2011) and was used in this research to check the reliability of the scale used. Threemethods majorly had been used in construction engineering and management field even that there seems to be no definite method of determining consensus in a Delphi survey (Rayens & Hahn, 2000; Holey *et al.*, 2007; Aigbavboa, 2013; Ameyaw *et al.*, 2016).

According to Holey *et al.* (2007); Hsu and Sandford (2007); Hallowell and Gambatese (2010) and Hallowell *et al.* (2011) the standard deviation method along with the calculated mean value for each item is common. Other researchers also preferred the use of Kendall’s correlation Coefficient value in analysing data gathered from a Delphi survey (Hallowell *et al.*, 2011;Hon *et al*.,2012; Tymvios & Gambatese, 2016; Ojo & Ogunsemi, 2019).

For the purpose of this study, the opinions of Hallowell and Gambatese(2009); Hallowell *et al.* (2011); and Hsu and Sandford (2007) were employed. That is to say that the calculated mean values and standard deviation values were employed. To add robustness to the analysis, the mean was also ranked and an analysis of variance (ANOVA) was done to check if there was significant variance in the responses of the panellists in the three rounds of Delphi. Although the opinions of many researcher were combined and utilized, the final conclusions were based on panellists’ opinion since there was need to establish factors applicable to the Nigerian public construction sector.

4.10 Mean Item Score

Many previous studies have made use of mean scores such as Chew *et al.,* 2008; Jusoh and Parnell, 2008;Yogita *et al.,* 2016. This is a combined scale where the resulting scale score for an individual is the sum of the individual item scores. The mean score for each of the items in the questionnaire was determined using this formula:

Mean Score = $\frac{5n5+4n4+3n3+2n2+1n1}{n5+n4+n3+n2+n1}$

$$Equation\ 2$$

Where; n1 = number of respondents who answered “very low”

n2 = number of respondents who answered “low”

n3 = number of respondents who answered “moderate”

n4= number of respondents who answered “high”

n5= number of respondents who answered “very high”

4.11 Factor Analysis

Factor analysis is a data reduction technique that takes a large number of variables and finds a way to'reduce' or summarize the data using fewer factors or components. It accomplishes this by looking for 'clumps' or classes in the interrelationships of a large number of variables. With all but a few variables, this is an almost impossible job to do 'by eye.' (Pallant, 2011). Hair *et al.*(2010) identified factor analysis as a statistical tool for examining multivariate, fundamental structures, orinterrelationship structure in a large number of variables. It does so by defining which variables are strongly correlated, thus, clusters or sets of variables are created which are agreed to contribute to a common construct.

According to Pallant (2011), Factor analysis involves two techniques: principal component analysis (PCA) and factor analysis (FA). These two techniques are similar in several ways, and researchers frequently use them interchangeably. Both seek to generate a smaller number of linear combinations of the original variables in such a way that a large portion of the variability in the correlation pattern is captured (or accounts for). Stevens (2012) admitted to aninclination for principal component analysis and provides numerous reasons for this. It was said to be more mathematically sound and simpler, and it does away with some of the potential issues associated with factor analysis of factor indeterminacy.Tabachnick and Fidell (2007) examined the use of PCA and FA and concluded, "If a researcher wants a theoretical solution that is free of unique and error variability, FA is the way to go." PCA, on the other hand, is a better choice if all you need is an empirical summary of the data set. Based on these, the PCA was chosen for this study. The PCA was thus used to identify items which are least related to the constructs under study for suppression thereby leaving only those items which are most related to the construct.

4.12 Analysis of Variance(ANOVA)

ANOVA is a statistical procedure for determining if the means of 2 or more groups differ significantly from one another. ANOVA compares the means of different samples to determine the impact of one or more factors (Singh, 2018). This was used to check if the means of the three rounds of Delphi survey differed significantly from one another.

4.13 Correlation Analysis

Correlation analysis is made use of to determine the strength and direction of a two-variable linear relationship (Pallant, 2011). Hair *et al*. (2010) identified statistical correlation as an important step in the development of a regression model (s). Correlation coefficient values can range from +1 to -1, with +1 indicating a perfectly positive correlation relationship, 0 indicating no relationship, and -1 indicating a perfectly negative correlation relationship. Management researchers frequently employ correlation analysis as a methodological approach (Oyewobi, 2014).Pearson correlational analysis was used to investigate the nature of the relationship between the researches constructs.

4.14 Multiple Regression Analysis

Multiple regression is a statistical technique for examining the relationship between a single continuous dependent variable and a number of independent variables or predictors (usually continuous). Multiple regression is based on correlation, but it allows for a more in-depth examination of the interrelationships between a set of variables (Pallant, 2011). It is a tool for analysing both the predictive forces and the extent to which the independent variables influence the dependent variable(Kerlinger & Lee, 2000; Pallant, 2011).

To test the hypotheses and evaluate the resulting models, this study used standard, also known as simultaneous multiple regression analysis. In the standard multiple regression analysis, all independent/predictor variables are entered at the same time or simultaneously. Each independent variable is rated based on its predictive power in comparison to all other independent variables (Pallant, 2011). As a result, a researcher creates an equation in which each predictor variable has its own coefficient and the dependent (outcome) variable is calculated by multiplying all of the variables by their respective coefficients plus a residual term (Field, 2013). These coefficients represent the relative contribution of the independent variables to the overall model(s) prediction and help to clarify the effect of the variable's predictive power (Hair *et al*., 2010).

The standard/simultaneous multiple regression analysis was chosen for this study because it gives room for multiple independent variables to be entered at once so that its predictive ability could be checked against dependent variables one at a time since there was no need to control any of the variables.

4.15 Partial Least Square Structural Equation Modelling (PLS-SEM)

SEM is described as a second generation multivariate data analysis (MDA) that incorporates aspects of factor analysis and regression analysis in order to assess the relation between defined measurement variables and predetermined constructs. (Chin, 1996; Hair *et al.*, 2014).Recent use of this technique in the development and testing of hypotheses has become common in most social science research (Mojtahedu, 2015). As stated by Ali *et al.* (2018), in mostresearches, the key reason for using this method is its ability to test simultaneously series of interrelated dependency relationships that occur in various sets of constructs, calculated by multiple variables and at the same time account for measurement error. PLS-SEM, according to Hair *et al*. (2017), can confirm theory, explain the relationship between variables, and analyse constructs formed with formative and reflective indicators. SEM was used in this research to determine the hypothesized relationship between the constructs.

According to Ali *et al*. (2018) and Wong (2013), three types of SEMexist (CB-SEM, PLS-SEM and GSCA) with the two of the most common being CB-SEM and PLS-SEM. This study employed the use of Partial least square Structural equation modelling (PLS-SEM). The PLS-SEM is most often done using the smart PLS (for this study, smart PLS package Version 3.3.2 was used).PLS-SEM employs the Regression-based Ordinary Least Squares (OLS) technique as an estimation tool to describe total variance in a dataset(Gefen *et al.*, 2000). It uses an iterative OLS method to evaluate each of the constructs one by one.PLS-SEM is a variance-focused method that uses total variance to estimate parameters (Hair *et al*., 2017).

Furthermore, Ali *et al.* (2018) noted that PLS-SEM is the most popular SEM technique in various fields that has gained considerable attention. Its use is evident in business marketing (Henseler *et al.*, 2009;Hair *et al.*, 2012), management of organisations (Sosik *et al.*, 2009), international management (Richter *et al.*, 2016), management of human resources (Ringle *et al.*, 2019). In construction-related studies, PLS-SEM has equally gained significant recognition (Aghimien, 2020).Table 4.2 gives summary of the research approach for this research while figure 4.1 gives an illustration of the research methodology.

Table 4.2: Summary of Research Approach

Research Aim	The aim of the study is to develop an electronic-procurement implementation model for the public sector construction projects in Abuja, with a view to enhancing the procurement process and ensuring effective contract execution.
Research Objectives	1. To identify and examine the impacts of external variables on electronic-procurement implementation in public sector construction projects in Nigeria. 2. To identify and examine the drivers and potential values to the implementation of electronic-procurement in the public sector construction projects in Nigeria. 3. To examine the barriers to the implementation of electronic-procurement in the public sector construction projects in Nigeria. 4. To establish the operational requirements for electronic-procurement implementation in the public construction sector construction projects in Nigeria. 5. To develop and validate an electronic-procurement model to improve public sector construction procurement process in Nigeria.
Research Questions	1. What are the impacts of external variables on electronic-procurement implementation in the public construction sector in Nigeria? 2. What are the drivers and potential values to the implementation of electronic-procurement in the public sector construction projects in Nigeria? 3. What are the barriers to the implementation of electronic-procurement in the public sector construction projects in Nigeria? 4. What is the operational requirement of electronic-procurement in the public sector construction projects in Nigeria? 5. How can a model be developed and validated for e- procurement implementation in the public sector construction process in Nigeria?
Research paradigm	Pragmatic Paradigm
Research methodology	Mixed method methodology
Research strategy	Sequentialmixed method
Research Tools	Structured close ended Questionnaire

Source: Researcher's Construct(2018)

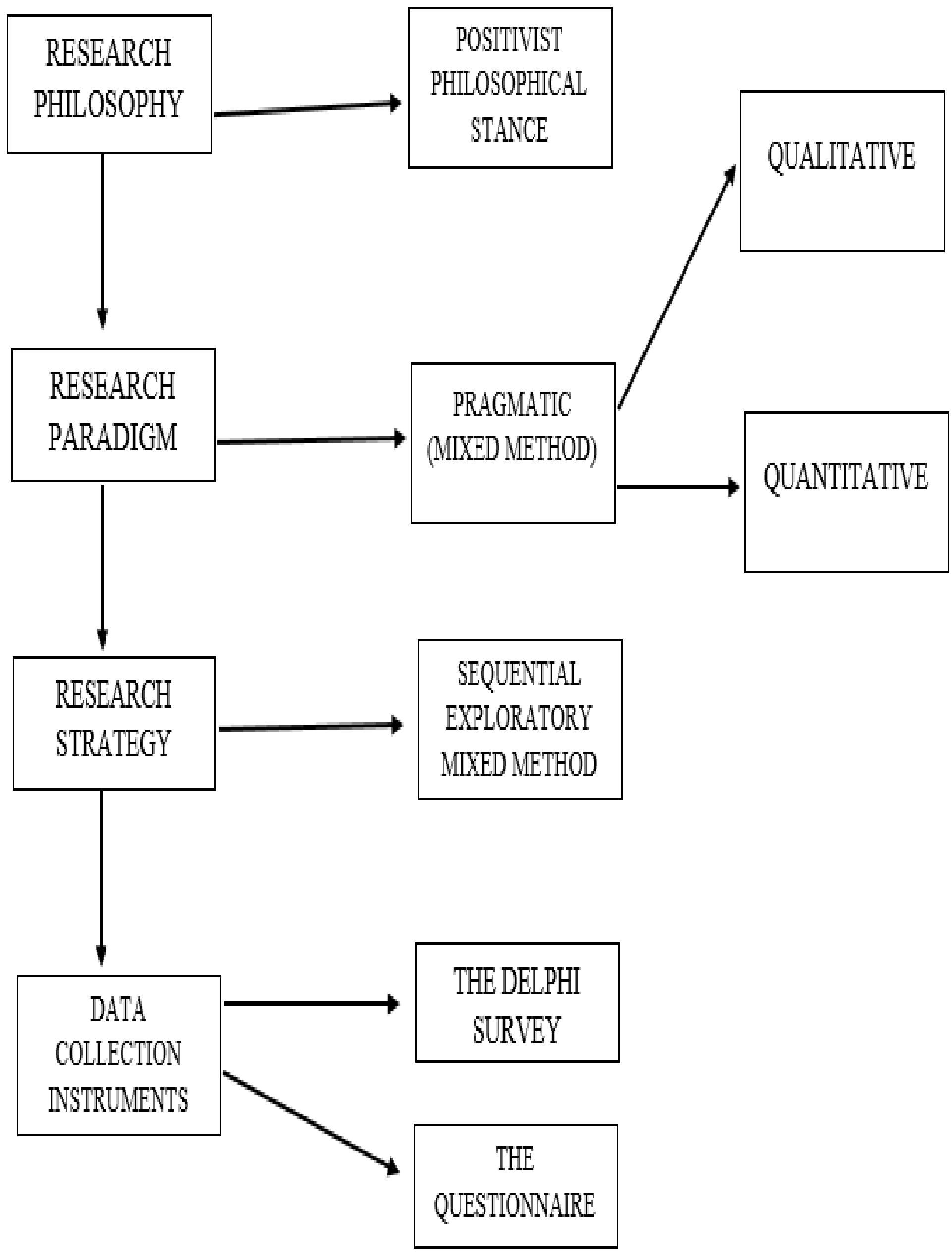


Fig4.3 Illustration of the research methodology

CHAPTER FIVE

5.0 RESULTS AND DISCUSSIONS

5.1 Respondents' Demographic Information

In Table 5.1for the Delphi survey, a total of twelve respondents (panellist) were used. These respondents were drawn across the three parastatals of interest (four from each parastatal). All twelve were Procurement officers with first degree (BTech/ BSc) and Master's degree. The number of respondents with first degrees were 4 (BTech/BSc) while 8 had master's degrees. They had vast experiences in the procurement process with years of experience ranging 5 to 16 years above. All officers considered had extensive knowledge of the procurement processes and were directly involved in the procurement processes of their organisations. There was no emphasis on the area of specialisation of these officers. It can be concluded that from the respondents' demographic characteristics, that all panellist were qualified for selection in all set criteria for the Delphi survey. The criteria thus listed were fulfilled.

Criteria 1: procurement officers in MDAs directly involved in construction procurement for the public sector (FCDA, FHA, Federal Ministry of Works and Housing).

Criteria 2: procurement officers having extensive experience in public sector construction procurement selection process.

Criteria 3: Procurement officers with at least a university degree.

From the demographic characteristics of the respondents, it can be concluded that the panellists were qualified to take part in the Delphi survey and as such, their opinions are considered valid for the study.

Table 5.1 Analysis of Respondents' Demographic Information for the Delphi

Respondents	Organisation	Position	Education	Years of experience	Affiliation	Having extensive Knowledge		Direct involvement in pro. process		Years involved in procurement process
						Yes	No	Yes	No	
1	FMWH	Chief pro. Off	Masters	11-15	Pro. officer	√		√		6-10
2	FCDA	Chief pro. Off	BTech	11-15	Pro.officer	√		√		6-10
3	FMWH	Ass. Dir. Pro	Masters	6-10	Pro. officer	√		√		6-10
4	FCDA	Ass. Dir. Pro	Masters	16 above	Pro.officer	√		√		11-15
5	FCDA	Pro.off II	B-tech	0-5	Pro.officer	√		√		0-5
6	FCDA	Chief pro.Officer	Masters	16 above	QS	√		√		16 above
7	FHA	Pro.Officer	Masters	16 above	QS	√		√		6-10
8	FHA	Chief Adm.officer pro	Masters	16 above	Pro officer	√		√		6-10
9	FHA	Chief pro off	B.Tech	16 above	pro officer	√		√		11-15
10	FMWH	Asst. Dir.Pro	Masters	16 above	Pro officer	√		√		6-10
11	FHA	Agm Pro	Master	16 above	QS	√		√		0-5
12	FMWH	Asst Direct.Pro	BTech	6-10	Pro.Off	√		√		6-10

5.2 The Delphi Survey Results

The respondents for the first round of the survey were drawn from FMWH, FCDA and FHA. This was so because these parastatals have individuals who areexperts in procurement activities for the public sector. The respondents were procurement officers with requisite experience about procurement processes.

The Delphi survey which was conducted to establish most significant factors with regards to the implementation of electronic-procurement in the public construction sector.In the analysis of responses of the panellists, the mean, standard deviation and the Cronbach Alpha were determined to establish reliability of the scales used.For the three rounds, an analysis of variance (ANOVA) was performed.

For the first round of the Delphi survey, the panellists were given a structured questionnaire to fill out with their responses. The responses were taken and analysed and this informed a reviewed questionnaire for round two since the opinions of the panellists were put into absolute consideration and those items which were rated low by the panellists were dropped and a new questionnaire emerged as Round two questionnaire. In the analysis of the round two, though the opinions of the panellists was the most important to the researcher, after the analysis was done,it was noted. The same questionnaire with responses of the panellists included was administered to the panellists as the round three Delphi survey. This was to enable the panellists reaffirm their responses.

The Cronbach's Alpha coefficient of all the items in the questionnaire were checked. All items had Alpha levels of above 0.70 which is a benchmark for significance except for people item which had an Alpha coefficient of 0.302 and 0.361 which were less than 0.70 (Table 5.2, 5.3 and 5.4). This was thought to be so because of the little number of items involved.

According to Pallant (2011), when Alpha level is lower than 0.70, especially in cases which has low item number, then the inter item correlation should be checked. In this case, the inter item correlation ranged between 0.2 and 1.0 which is said to be acceptable (appendix E). The questionnaire scale wasthus said to be reliable.

The most important item in all the constructs needed to be established as such, the Mean, Standard Deviation (SD) and Rank were established in the first round.Field (2013) suggested that where two items have the same mean values, the item with a lower SD value is ranked first and this was employed in this study.An analysis of variance (ANOVA) was done to establish if a statistical significant varianceexistamongst the opinions of the panellists in the three rounds.

In making decisions regarding the perceptions of the respondents, a decision rule was set for the study as: all factors having mean score of less than3.0 will not be considered for subsequent round of the survey. Thereby saying that such factors will be dropped since they are considered not significant or non-applicable to the public construction sector in Nigeria.

Table 5.2 Reliability Values of the Scales for theDelphi Survey Round one

Factors	Measured constructs	Cronbach's alpha value
Challenges	1. Technology	0.769
	2. people	0.302
	3. process	0.665
Drivers		0.897
Barriers		0.953
Benefits	1. Benefits to clients	0.933
	2.Benefits to contractors	0.702
	3. Benefits to public	0.783
Operational Requirement		0.877
Potential values		0.987

Table 5.3 Reliability Values of the Scales for the Delphi Survey Round two

Factors	Measured constructs	Cronbach's alpha value
Challenges	1. Technology	0.773
	2. people	0.361
	3. process	0.776
Drivers		0.926
Barriers		0.720
Benefits	1. Benefits to clients	0.857
	2.Benefits to contractors	0.912
	3. Benefits to public	0.915
Operational Requirement		0.875
Potential values		0.931

Table 5.4 Reliability Values of the Scales for the Final Survey

Factors	Measured constructs	Cronbach's alpha value
Challenges	1. Technology	0.773
	2. people	0.361
	3. process	0.776
Drivers		0.926
Barriers		0.720
Benefits	1. Benefits to clients	0.857
	2.Benefits to contractors	0.912
	3. Benefits to public	0.915
Operational Requirement		0.875
Potential values		0.931

5.2.1 Impacts of external variables on implementation of electronic-procurementround one

A number of factors have been identified from literature as impacts of external variables on implementation of electronic-procurement across countries, however, score of these factors may be country specific.Hence, the most significant factors considered as having impacts to Electronic-procurement in the public Nigerian construction sector, are to be established as such, the roundone of the Delphi survey was conducted, and results are presented in the sections that follow.

Table 5.5is a presentation of an analysis of the responses received in the first round of the Delphi survey to the question of challenges to electronic-procurement implementation. The factors were structured into Technology (TCH), people (PPL) and process (PRO) and the analysis were done as such.

Table 5.5: Impacts of External Variables on Implementation of Electronic-procurement Round one

Code	Factors	Mean item Score	Standard Deviation	Rank
	Technology			
TCH1	Lack of authentication of electronic-procurement	3.25	1.29	4
TCH2	Internet Diffusion	2.83	1.70	8
TCH3	Non- availability of reliable ICT Infrastructure	3.50	1.45	2
TCH4	Security and privacy concerns of information exchange	3.17	1.40	5
TCH5	Investment in electronic devices	2.92	1.31	7
TCH6	Expensive internet services in Nigeria	3.42	1.38	3
TCH7	Low rate of internet diffusion	3.08	1.31	6
TCH8	Non availability of high speed internet	3.67	1.37	1
	People			
PPL1	Lack of trust to share information among partners	2.75	1.42	4
PPL2	Human resource hiring development	3.00	1.35	2
PPL3	Citizen expectations	2.25	1.71	6
PPL4	Lack of readiness	2.42	1.73	5
PPL5	Lack of availability of skilled personnel to handle electronic-procurement tools and processes	3.42	1.38	1
PPL6	Lack of knowledge of the benefits of electronic-procurement use.	2.92	1.62	3
	Process			
PRO1	Lack of standards	3.67	1.16	3
PRO2	Lack of laws	3.42	1.38	6
PRO3	Political challenges	4.25	0.97	1
PRO4	Electricity supply	4.00	1.41	2
PRO5	Lack of capital	3.17	1.40	7
PRO6	Fear to change into a new system	3.58	1.51	5
PRO7	Non Availability of training procedure	3.67	0.89	4

5.2.1.1 Technology

The items were ranked to present the factors that have very high level of impacts to the implementation of electronic-procurement. From Table 5.3, eight items which the mean value and standard deviation were found and also ranked. Non- availability of high speed internet had a mean value of 3.67, ranked 1st, non-availability of reliable ICT Infrastructure had a mean value of 3. 50 and ranked 2ndExpensive internet services in Nigeria had a mean value of 3.42, ranked 3rd, Lack of authentication of electronic-procurement internet diffusion had a mean value of 3.25and ranked 4th, Security and privacy concerns of information exchange, Low rate of internet diffusion, Investment in electronic devices, internet Diffusion had mean values of 3.17, 3.08, 2.92 , 2.83 respectively.

Based on the set decision rule of items having greater than or equalto 3.0 mean value to be retained, six items were retained to be presented in the next round on Delphi. Furthermore, investment in electronic devices and Internet Diffusion which had mean values of 2.92 and 2.83 were dropped off since they did not meet the study's established criteria

5.2.1.2 People

Five items were identified under this sub- construct and these items were ranked after the analysis which showed that lack of availability of skilled personnel to handle Electronic-procurement tools and processes was the most important and thus ranked 1st with mean value 0f 3.42, Human resource hiring development ranked 2nd with mean value of 3.00. The remaining four factors (lack of trust to share information among partners, citizen expectations, Lack of readiness, Lack of knowledge of the benefits of Electronic-procurement) had mean values less than 3.0; they were dropped off and were not presented for the next round of Delphi survey.

5.2.1.3 Process

During extensive review of literature, seven process-related items were identified and were considered relevant to the study. They were all subjected to descriptive analysis and all the items had mean values of above 3.0, and were thus all forwarded to the subsequent questionnaire for the round two of Delphi survey based on set decision rule.

5.2.2 Drivers to the implementation of electronic-procurement round one

From literature, driver items to electronic-procurement were identified and these were put forth to the panellists. In table 5.6 at the end of the first round of the Delphi Survey, Size of organization had a mean value of 2.83, the increase in profit margin associated with E-procurement had a mean value 0f 2.92, Gaining competitive advantage had mean value of

2.92. These items were not retained for the next round of Delphi survey due to the fact that they did not meet the set decision rule for the study.

Table 5.6: Drivers to the Implementation of Electronic-procurementRound one

Code	Factors	Mean item Score	Standard Deviation	Rank
DRI1	Availability of IT manpower in the organization	4.00	1.35	8
DRI2	Reduction in errors associated with paper-based methods	3.92	1.08	10
DRI3	Reduction in time spent on procurement process	4.25	1.22	3
DRI4	Less paper work	4.33	1.07	2
DRI5	Efficiency of collaboration amongst project team	4.08	1.08	5
DRI6	Availability of electronic-procurement packages	3.45	1.57	20
DRI7	Less labour intensive feature of electronic-procurement	3.75	1.96	16
DRI8	Decision by our clients/service providers to use electronic-procurement	3.50	1.31	19
DRI9	Perceived benefits associated with reduction in the procurement cost	4.17	1.34	4
DRI10	Benefit of competitiveness inherent in electronic-procurement	4.00	1.41	9
DRI11	Benefits of enhanced level of efficiency in job delivery	3.58	1.88	18
DRI12	Benefits of elimination of geographic barriers in procurement	3.75	1.66	15
DRI13	Benefits of effective communication between project team members	4.08	1.44	6
DRI14	Compatibility of electronic-procurement with our existing procurement process	3.67	1.67	17
DRI15	Financial base of organization	3.17	1.34	24
DRI16	Size of organization	2.83	1.40	28
DRI17	Ease of use of electronic-procurement technology and tools	4.58	0.67	1
DRI18	Number of existing users amongst business partners	3.17	1.59	25
DRI19	Geographical spread of the business activities of the organization	3.33	1.50	22
DRI20	Transparent transaction process	4.08	1.56	7
DRI21	The increase in profit margin associated with e- procurement	2.92	1.88	27
DRI22	Faster problem solving due to access to real –time information	3.83	1.80	13
DRI23	Reduced staffing levels in procurement	3.83	1.70	12
DRI24	Price reduction in tendering	3.33	1.30	21
DRI25	Gaining competitive advantage	2.92	1.78	26
DRI26	Enhanced decision making and market intelligence	3.33	1.72	23
DRI27	Increased accuracy of production capacity	3.75	1.42	14
DRI28	Reduced operating and inventory costs	3.92	1.50	11

5.2.3 Benefits of electronic-procurement implementation round one

5.2.3.1 Benefits to the client

A number of items were identified from literature as benefits to electronic-procurement and for this study, they were grouped under three headings.Table5.7 shows that all items identified and used in the first round of the Delphi survey had mean values greater than 3.0, based on the decision rule, all factors were retained after the round one of the Delphi survey since they all had mean scores over 3.0, and they fulfilled the decision rule set for the study, they were all forwarded to the round two Delphi questionnaire.

5.2.3.2 Benefits to the Contractor

Table 5.7 shows all items also fulfilled the set decision for the study and they were all retained for the round two Delphi survey.

5.2.3.3.Benefits to the public

All items had mean values of greater than 3.0 from Table 5.7. Having fulfilled the set decision rule for the study, they were all retained for the round two of Delphi survey.

Table 5.7:Benefits of Electronic-procurement Round one

Code	Factors	Mean Item Score	Standard Deviation	Rank
Benefits to the client				
BCL1	Elimination of intermediaries	4.42	0.67	2
BCL2	Improved and efficient negotiation	3.50	1.73	12
BCL3	Reduced exchange cost	3.00	1.95	14
BCL4	Process shortening	3.92	1.24	8
BCL5	Price reduction	3.33	1.72	13
BCL6	Time reduction	4.33	1.15	4
BCL7	Improved control and communication	4.00	1.48	7
BCL8	Effectiveness and efficiency	4.58	0.67	1
BCL9	Identifying potential sourcing opportunities	3.50	1.78	11
BCL10	Reduced inventory levels	3.75	1.14	9
BCL11	Less paper work	4.25	1.60	5
BCL12	Standardization of processes	4.42	0.67	2
BCL13	Decentralized procurement process	4.08	1.24	6
BCL14	continual usage by organizational employees	3.58	1.38	10
Benefits to the contractor				
BCO1	Improved customer satisfaction	4.42	0.90	4
BCO2	Improved relationship with other firms	3.50	1.38	13
BCO3	It has an impact on service quality	4.33	0.89	7
BCO4	Work process mechanization	3.08	1.93	14
BCO5	Better transparency and checking	4.67	0.49	1
BCO6	Improved leverage on spending	3.67	1.56	11
BCO7	Reduced influence of bureaucracy	4.08	1.44	9
BCO8	Impact on process capability, productivity and dependability	4.08	1.08	10
BCO9	Immediate availability of information	4.33	1.50	7
BCO10	Minimum duplication	4.58	0.51	3
BCO11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices	4.58	0.67	2
BCO12	Returning to investment	3.67	1.07	12
BCO13	It improves communication between buyer and suppliers	4.42	0.67	4
BCO14	provides wider base of buyers and suppliers,	4.42	0.67	4
Benefits to the public				
BPU1	It has an impact on cost efficiency, customer service	4.25	0.62	3
BPU2	higher organizational performance	4.42	0.90	1
BPU3	Quality outcome	4.08	1.38	5
BPU4	user satisfaction	4.08	1.38	5
BPU5	cost-effective technology which improves public trust	4.33	0.89	2
BPU6	Supply chain integration.	3.83	1.34	9
BPU7	streamlining the ordering process to obtain significant efficiencies	4.25	0.62	3
BPU8	Improvement in internal service quality	4.00	0.95	8
BPU9	Clear and achievable implementation phase	3.75	1.54	10
BPU10	Clear accountability for buying in organizational structure	4.08	0.99	7

5.2.4 Barriers to the implementation of electronic-procurement round one

In the first round of the Delphi survey, Barriers to the implementation of electronic-procurement from table 5.8 all had mean values from the responses to be higher than 3.0.Based on this, all the barrier factors were retained for the round two of the Delphi Survey in adherence to set decision rule.

Table 5.8: Barriers of Electronic-procurement Round one

Code	**Factors**	**Mean Item Score**	**Standard Deviation**	**Rank**
BAR1	Lack of technical knowledge and skills	3.50	1.38	24
BAR2	Lack of financial resources (capital)	3.91	1.16	10
BAR3	Resistance to change	3.83	1.19	12
BAR4	Security in the process - Data transmission to the wrong person	3.75	1.29	19
BAR5	High investment cost	3.75	0.97	16
BAR6	Lack of laws on Electronic-procurement	4.00	1.21	6
BAR7	Investment in electronic devices	4.08	0.90	3
BAR8	Investment in human resource development	3.33	1.30	26
BAR9	Lack of evidence of the benefits of electronic-procurement in the building industry	3.75	1.14	17
BAR10	It not being the top initiative or priority of the company	3.92	1.31	9
BAR11	Lack of interoperability and standards with traditional communication systems	3.83	1.19	12
BAR12	Lack of top management support and commitment	3.83	1.34	15
BAR13	Lack of motivation of people	4.00	0.95	4
BAR14	Resistance to new technology	3.83	1.19	12
BAR15	Complicated procedures and extended Relationships	4.17	0.94	2
BAR16	Partial Data Display - incomplete documents provided	3.33	1.23	25
BAR17	Clarity of sender and tenderer information	3.75	1.14	17
BAR18	Enforceability of electronic contracts	3.75	1.29	19
BAR19	Information technology investment costs	3.92	1.00	7
BAR20	Confidentiality of information – unauthorised viewing	4.00	1.04	5
BAR21	Prevention of tampering with documents -changes to documents	3.58	1.24	23
BAR22	Lack of flexibility	3.83	1.11	11
BAR23	Lack of business relationship with companies providing electronic-procurement	3.92	1.08	8
BAR24	Slow Internet network connectivity	3.67	0.89	21
BAR25	Expensive internet services in Nigeria	3.67	1.44	22
BAR26	Low rate of internet diffusion	4.25	0.62	1
BAR27	No business benefit realised	3.25	1.54	27

5.2.5 Operational requirements for electronic-procurement implementation round one

From literature, 21 factors were listed as operational requirements for Electronic-procurement implementation in the first Delphi round, the respondents rated them and the result of the responses obtained are as shown in Table 5.9. Most of the factors had mean score of above 3.0, only Organisational size had a mean score below 3.0. However, the set decision rule was applied; size of organisation was dropped and other factors were retained and put forth for the round two of the Delphi Survey.

Table 5.9: Operational Requirements for Electronic-procurement Implementation Round one

Code	Factors	Mean Item Score	Standard Deviation	Rank
OPR1	Technological availability	4.42	0.67	4
OPR2	Availability of trained personnel	4.33	0.78	7
OPR3	Infrastructural availability	4.25	0.87	8
OPR4	Organisational willingness	4.17	0.94	11
OPR5	High level of ICT knowledge and skills	4.42	0.67	4
OPR6	Provision of Security, privacy and trust concerns	3.92	1.44	16
OPR7	Financial capability	4.08	1.44	13
OPR8	Organisational size	2.75	1.66	21
OPR9	Good knowledge of electronic-procurement	4.50	0.67	2
OPR10	Availability of training procedure	4.50	0.67	2
OPR11	Employee competence	4.25	0.87	8
OPR12	Management commitment on implementation of electronic-procurement	4.42	0.67	4
OPR13	Appropriate implementation framework	4.08	0.90	12
OPR14	Supplier identification	3.42	1.62	18
OPR15	Supplier assessment	3.42	1.68	19
OPR16	Development and review of procurement strategy	3.83	1.47	17
OPR17	Availability of affordable Internet service in Nigeria	4.67	0.65	1
OPR18	Availability of high speed internet	4.25	0.62	10
OPR19	High rate of internet diffusion	3.33	1.83	20
OPR20	High level of awareness of electronic-procurement	4.00	1.41	15
OPR21	Availability of organisation website	4.08	1.44	13

5.2.6 Potential values that will be derived from effective implementation of electronic-procurement round one

Potential values that will be derived from effective implementation of electronic-procurement as rated by the respondents is shown in Table 5.10. All of the factors had a mean score of greater than 3.00 and all factors were thereby retained for the round two of the Delphi Survey.

Table 5.10: Potential values that will be derived from effective electronic-procurement implementation round one

Code	Factors	Mean Item score	Standard Deviation	Rank
POV1	Elimination of paperwork	4.00	1.54	5
POV2	Time reduction	3.92	1.56	8
POV3	Price reduction	3.17	1.64	21
POV4	Transparency	4.17	1.47	2
POV5	Corruption elimination	4.00	1.54	5
POV6	Bureaucracy elimination	3.92	1.56	8
POV7	Standardization of process	3.83	1.40	10
POV8	Process shortening	3.58	1.62	14
POV9	The efficiency of procurement process	3.92	1.51	7
POV10	Exposure to new technologies	4.17	1.53	3
POV11	Closer and more effective relationship between partners	3.08	1.62	23
POV12	Strengthening the trading relationship between different partners	3.08	1.62	23
POV13	Improving product and service quality	3.50	1.51	17
POV14	Fast and efficient procurement process.	4.00	1.48	4
POV15	Reduction in redundant cost	3.25	1.71	19
POV16	Organizational competitiveness	3.33	1.56	18
POV17	Giving rise to innovative ideas	3.75	1.36	13
POV18	Faster arrival of products from the supplier.	3.25	1.71	19
POV19	improving the speed of service	3.58	1.68	15
POV20	quality, reliability and trust	3.75	1.54	1
POV21	Accountability	4.25	1.42	1
POV22	Central coordination and aggregation of demand	3.17	1.85	22
POV23	User satisfaction	3.50	1.38	16
POV24	Improvement in internal service quality	3.83	1.40	10

5.3 Round Two Delphi Survey

The round two Delphi survey was carried out to give the panellists another opportunity of revising their position as regards their responses in the round one of the Delphi survey. The round two questionnaire was developed from the responses achieved in the round one Delphi Survey and this was presented to the panellists as a revised version of the round one survey questionnaire all items that did not meet the set decision rule were thus dropped.

5.3.1 Impacts of external variables on implementation of electronic-procurement round two

Table 5.11shows the results for the impacts of external variables on the implementation of electronic-procurement in round two the table shows the mean, standard deviation and the rank. Critically looking at the table, for the technology factor, lack of authentication of electronic-procurement and security and privacy concerns of information exchange were the items that had mean values less than 3.0. For the people factor, both items presented had mean values of greater than 3.0 while for the process factor,all the items presented and rated had mean values of greater than 3.0. Items which had mean value less than 3.0 were supposed to be dropped off because the panellists' opinions suggested that thoseitems had very low to no level of impact on the implementation of electronic-procurement in their organisations and in essence, these factors will not be presented for further survey as they do not have impacts on to electronic-procurement implementation in the public construction sector.

Table 5.11: Impacts of external variables on implementation of electronic-procurement round two

Code	Factors	Mean Item Score	Standard Deviation	Rank
	Technology			
TCH1	Lack of authentication of electronic-procurement	2.42	1.62	6
TCH2	Non- availability of reliable ICT Infrastructure	4.00	1.04	4
TCH3	Security and privacy concerns of information exchange	2.92	1.16	5
TCH4	Expensive internet services in Nigeria	4.33	1.15	2
TCH5	Low rate of internet diffusion	4.00	0.95	3
TCH6	Non availability of high speed internet	4.50	0.80	1
	People			
PPL1	Human resource hiring development	3.08	1.24	2
PPL 2	Lack of availability of skilled personnel to handle electronic-procurement tools and processes	3.58	1.24	1

	Process			
PRO1	Lack of standards	3.17	1.70	6
PRO2	Lack of laws	3.67	1.07	5
PRO3	Political challenges	4.17	0.83	3
PRO4	Electricity supply	4.42	0.51	1
PRO5	Lack of capital	3.08	1.31	7
PRO6	Fear of change into a new system	4.08	0.67	4
PRO7	Non Availability of training procedure	4.42	0.51	1

5.3.2 Drivers to the implementation of electronic-procurement round two

For Drivers to the implementation of Electronic-procurement , when a revised questionnaire was presented to the panellists as round two questionnaire, decision by our clients/service providers to use Electronic-procurement, benefit of competitiveness inherent in electronic-procurement, had a mean score of less than 3.0.

Table 5.12 Drivers to the Implementation of Electronic-procurement Round Two

Code	Factors	Mean Item Score	Standard Deviation	Rank
DRI1	Availability of IT manpower in the organization	4.42	0.51	1
DRI2	Reduction in errors associated with paper-based methods	3.33	0.89	17
DRI3	Reduction in time spent on procurement process	3.25	1.71	20
DRI4	Less paper work	3.75	1.36	7
DRI5	Efficiency of collaboration amongst project team	3.17	1.03	21
DRI6	Availability of electronic-procurement packages	3.67	0.98	13
DRI7	Less labour intensive feature of electronic-procurement	3.75	0.62	9
DRI8	Decision by our clients/service providers to use electronic-procurement	2.83	1.19	24
DRI9	Perceived benefits associated with reduction in the procurement cost	3.83	0.83	5
DRI10	Benefit of competitiveness inherent in electronic-procurement	2.50	1.17	25
DRI11	Benefits of enhanced level of efficiency in job delivery	3.75	1.36	7
DRI12	Benefits of elimination of geographic barriers in procurement	3.83	0. 83	5
DRI13	Benefits of effective communication between project team members	3.67	0.65	11
DRI14	Compatibility of electronic-procurement with our existing procurement process	3.67	0.89	12
DRI15	Financial base of organization	3.33	0.98	18
DRI16	Ease of use of electronic-procurement technology and tools	3.50	1.00	16
DRI17	Number of existing users amongst business partners	3.08	1.31	22
DRI18	Geographical spread of the business activities of my organization	3.75	1.14	10
DRI19	Transparent transaction process	4.25	1.36	2

DRI20	Faster problem solving due to access to real –time information	3.92	0.51	4
DRI21	Reduced staffing levels in procurement	3.08	1.38	23
DRI22	Price reduction in tendering	3.58	0.67	14
DRI23	Enhanced decision making and market intelligence	3.33	1.30	19
DRI24	Increased accuracy of production capacity	4.00	0.85	3
DRI25	Reduced operating and inventory costs	3.58	0 .67	14

5.3.3 Benefits of electronic-procurement round two

After the revised questionnaire for round two was retrieved and analysed, From Table 5.13, under the Benefit to clients' factor, only Improved and efficient negotiation had a mean score of 2.42 which was less than 3.0. For Benefit to contractor and benefit to public, all items under those factors had mean values of more than 3.0.

Table 5.13: Benefits of Electronic-procurement Round Two

Code	Factors	Mean Item Score	Standard Deviation	Rank
	Benefits to the client			
BCL1	Elimination of intermediaries	3.75	1.14	8
BCL2	Improved and efficient negotiation	2.42	1.08	14
BCL3	Reduced exchange cost	3.17	1.47	13
BCL4	Process shortening	4.00	1.28	5
BCL5	Price reduction	3.67	1.56	10
BCL6	Time reduction	4.00	1.28	5
BCL7	Improved control and communication	4.08	1.08	3
BCL8	Effectiveness and efficiency	4.00	1.04	4
BCL9	Identifying potential sourcing opportunities	3.75	1.06	7
BCL10	Reduced inventory levels	3.50	1.00	11
BCL11	Less paper work	4.33	1.15	2
BCL12	Standardization of processes	4.33	0.89	1
BCL13	Decentralized procurement process	3.50	1.38	12
BCL14	continual usage by organizational employees	3.67	0.98	9
	Benefits to the contractor			
BCO1	Improved customer satisfaction	4.42	0.99	2
BCO2	Improved relationship with other firms	3.50	0.90	14
BCO3	It has an impact on service quality	3.92	0.99	13
BCO4	Work process mechanization	4.42	.51	1
BCO5	Better transparency and checking	4.33	0.89	3
BCO6	Improved leverage on spending	4.00	0.74	9
BCO7	Reduced influence of bureaucracy	4.33	0.98	4
BCO8	Impact on process capability, productivity and dependability	3.92	0.79	12
BCO9	Immediate availability of information	4.00	1.04	10
BCO10	Minimum duplication	4.08	0.79	8
BCO11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices	4.17	0.72	5

BCO12	Return on investment	3.92	0.51	11
BCO13	It improves communication between buyer and suppliers	4.08	0.67	6
BCO14	provides wider base of buyers and suppliers,	4.08	0.67	6
	Benefits to the public			
BPU1	It has an impact on cost efficiency, customer service	4.25	0.75	4
BPU2	higher organizational performance	4.67	0.49	1
BPU3	Quality outcome	4.42	0.67	3
BPU4	user satisfaction	4.50	0.52	2
BPU5	cost-effective technology which improves public trust	4.17	1.19	6
BPU6	Supply chain integration.	3.33	1.15	10
BPU7	streamlining the ordering process to obtain significant efficiencies	3.67	0.98	8
BPU8	Improvement in internal service quality	3.58	1.08	9
BPU9	Clear and achievable implementation phase	3.75	1.14	7
BPU10	Clear accountability for buying in organizational structure	4.25	0.97	5

5.3.4 Barriers to implementation of electronic-procurement round two

The round two questionnaire was administered, retrieved and analysed; lack of financial resources (capital) , Security in the process - Data transmission to the wrong person,High investment cost,It not being the top initiative or priority of the company, Lack of interoperability and standards with traditional communication systems, complicated procedures and extended Relationships,Partial Data Display - incomplete documents provided, Clarity of sender and tenderer information, Confidentiality of information – unauthorised viewing, Prevention of tampering with documents -changes to documents, Lack of business relationship with companies providing electronic-procurement and no business benefit realised all had mean values lower than 3.0. Since these factors had mean values of less than 3.0, they were assumed not to be barriers to the implementation of electronic-procurement in the public construction sector. See Table 5.14 for the summary of this result.

Table 5.14: Barriers to Implementation of Electronic-procurement Round two

Code	Factors	Mean Item Score	Standard Deviation	Rank
BAR1	Lack of technical knowledge and skills	3.50	1.38	14
BAR2	Lack of financial resources (capital)	1.50	0.67	24
BAR3	Resistance to change	3.83	1.19	6
BAR4	Security in the process - Data transmission to the wrong person	2.08	1.16	16
BAR5	High investment cost	2.08	1.16	16
BAR6	Lack of laws on Electronic-procurement	4.00	1.21	4
BAR7	Investment in electronic devices	4.08	0.90	2
BAR8	Investment in human resource development	3.33	1.30	15
BAR9	Lack of evidence of the benefits of electronic-procurement in the building industry	3.75	1.14	10
BAR10	It not being the top initiative or priority of the company	1.92	1.16	20
BAR11	Lack of interoperability and standards with traditional communication systems	1.25	0.45	25
BAR12	Lack of top management support and commitment	3.83	1.34	9
BAR13	Lack of motivation of people	4.00	0.95	3
BAR14	Resistance to new technology	3.83	1.19	6
BAR15	Complicated procedures and extended Relationships	1.08	0.29	26
BAR16	Partial Data Display - incomplete documents provided	1.50	0.52	21
BAR17	Clarity of sender and tenderer information	1.08	0.29	26
BAR18	Enforceability of electronic contracts	3.75	1.29	11
BAR19	Information technology investment costs	3.92	1.00	5
BAR20	Confidentiality of information – unauthorised viewing	2.08	1.16	16
BAR21	Prevention of tampering with documents -changes to documents	2.08	1.16	16
BAR22	Lack of Flexibility	3.83	1.11	8
BAR23	Lack of business relationship with companies providing electronic-procurement	1.50	0.52	21
BAR24	Slow Internet network connectivity	3.67	0.89	12
BAR25	Expensive internet services in Nigeria	3.67	1.44	13
BAR26	Low rate of internet diffusion	4.25	0.62	1
BAR27	No business benefit realised	1.50	0.52	21

5.3.5 Operational requirements for electronic-procurement implementation round two

In round two Delphi survey and from Table 5.15, only supplier assessment had a mean score of less than 3.00 and ranked 20th.

Table 5.15: Operational Requirements for Electronic-procurement Implementation Round Two

Code	Factors	Mean Item Score	Standard Deviation	Rank
OPR1	Technological availability	4.58	0.67	1
OPR2	Availability of trained personnel	4.33	0.78	3
OPR3	Infrastructural availability	4.33	0.89	4
OPR4	Organisational willingness	4.00	0.74	11
OPR5	High level of ICT knowledge and skills	4.50	0.90	2
OPR6	Provision of Security, privacy and trust concerns	3.75	0.87	16
OPR7	Financial capability	3.67	1.50	17
OPR8	Good knowledge of electronic-procurement	4.17	0.83	9
OPR9	Availability of training procedure	4.25	1.22	8
OPR10	Employee competence	4.00	1.04	13
OPR11	Management commitment on implementation of electronic-procurement	4.08	1.31	10
OPR12	Appropriate implementation framework	4.25	0.87	7
OPR13	Supplier identification	3.08	1.24	19
OPR14	Supplier assessment	2.92	1.16	20
OPR15	Development and review of procurement strategy	3.58	1.08	18
OPR16	Availability of affordable Internet service in Nigeria	4.33	0.89	4
OPR17	Availability of high speed internet	4.33	0.89	4
OPR18	High rate of internet diffusion	4.00	0.85	12
OPR19	High level of awareness of electronic-procurement	3.83	0.72	15
OPR20	Availability of organisation website	3.92	0.90	14

5.3.6 Potential values that will be derived from electronic-procurement implementation round two

When a revised questionnaire was administered in round two, all items had mean values greater than 3.0. Thus signifying that they were all important as potential values that will be derived if electronic-procurement is implemented (see Table 5.16).

Table 5.16: Potential Values that will be derived from Electronic-procurement Implementation Round two

Code	Factors	Mean Item Score	Standard Deviation	Rank
POV1	Elimination of paperwork	4.67	0.65	1
POV2	Time reduction	4.17	1.11	10
POV3	Price reduction	4.08	1.16	12
POV4	Transparency	4.58	0.67	2
POV5	Corruption elimination	4.00	0.95	13
POV6	Bureaucracy elimination	4.50	1.17	3
POV7	Standardization of process	4.42	0.51	4
POV8	Process shortening	3.58	1.24	19
POV9	The efficiency of procurement process	4.25	0.62	6
POV10	Exposure to new technologies	4.17	0.83	9
POV11	Closer and more effective relationship between partners	3.17	1.03	22
POV12	Strengthening the trading relationship between different partners	3.08	0.79	23
POV13	Improving product and service quality	4.25	0.96	8
POV14	Fast and efficient procurement process.	3.75	0.87	18
POV15	Reduction in redundant cost	3.00	1.21	24
POV16	Organizational competitiveness	3.33	0.89	21
POV17	Giving rise to innovative ideas	3.83	1.19	17
POV18	Faster arrival of products from the supplier.	3.92	1.08	15
POV19	improving the speed of service	3.92	1.16	16
POV20	quality, reliability and trust	4.08	0.90	11
POV21	Accountability	4.42	0.79	5
POV22	Central coordination and aggregation of demand	3.92	0.90	14
POV23	User satisfaction	3.42	0.90	20
POV24	Improvement in internal service quality	4.25	0.87	7

5.4 Round Three Delphi Survey

The same questionnaire that was used in round two was presented again alongside the analysis of round two as round three questionnairefor panellists to review their responses, same items were still rated.

5.4.1 Impacts of external variables on implementation of electronic-procurement round three

Lack of authentication of electronic-procurement and Security and privacy concerns of information exchange had a mean score of less than 3.0 which did not meet the study's established criteria and these were supposed be dropped and should not be part of round three questionnaire (see Table 5.17) but since responses of the panellists needed to be re-affirmed, they were thus re-presented.

Table 5.17 Impacts of External Variables on Implementation of Electronic-procurement Round three

Code	Factors	Mean Item Score	Standard Deviation	Rank
	Technology			
TCH1	Lack of authentication of electronic-procurement	2.83	1.11	5
TCH2	Non- availability of reliable ICT Infrastructure	4.17	0.83	2
TCH3	Security and privacy concerns of information exchange	2.67	1.15	6
TCH4	Expensive internet services in Nigeria	4.17	1.03	3
TCH5	Low rate of internet diffusion	3.67	1.15	4
TCH6	Non availability of high speed internet	4.25	0.97	1
	People			
PPL1	Human resource hiring development	3.17	1.03	2
PPL2	Lack of availability of skilled personnel to handle electronic-procurement tools and processes	3.25	0.75	1
	Process			
PRO1	Lack of standards	3.50	1.24	5
PRO2	Lack of laws	3.50	0.67	6
PRO3	Political challenges	4.33	0.78	1
PRO4	Electricity supply	4.08	1.16	2
PRO5	Lack of capital	3.25	1.06	7
PRO6	Fear of change into a new system	3.58	0.67	4
PRO7	Non Availability of training procedure	4.08	0.51	3

5.4.2 Drivers to the implementation of electronic-procurement round three

In the round three Delphi survey, after analysis of received responses was done, Decision by our clients/service providers to use electronic-procurement, Benefit of competitiveness inherent in electronic-procurement were factors which had mean values less than 3.0 which did not meet the study's established criteria were dropped and these factors will not form part of the final survey questionnaire (see Table 5.18).

Table 5.18 Drivers to the Implementation of Electronic-procurementRound three

Code	Factors	Mean Item Score	Standard Deviation	Rank
DRI1	Availability of IT manpower in the organization	3.83	0.51	7
DRI2	Reduction in errors associated with paper-based methods	3.42	0.89	19
DRI3	Reduction in time spent on procurement process	3.58	1.71	17
DRI4	Less paper work	3.58	1.56	16
DRI5	Efficiency of collaboration amongst project team	3.17	0.94	20
DRI6	Availability of electronic-procurement packages	3.92	0.79	6
DRI7	Less labour intensive feature of electronic-procurement	3.83	1.19	9
DRI8	Decision by our clients/service providers to use electronic-procurement	2.83	1.03	24
DRI9	Perceived benefits associated with reduction in the procurement cost	3.67	1.07	12
DRI10	Benefit of competitiveness inherent in electronic-procurement	2.83	1.19	25
DRI11	Benefits of enhanced level of efficiency in job delivery	3.83	1.27	10
DRI12	Benefits of elimination of geographic barriers in procurement	3.83	1.11	8
DRI13	Benefits of effective communication between project team members	3.58	0.90	14
DRI14	Compatibility of electronic-procurement with our existing procurement process	3.17	1.19	21
DRI15	Financial base of organization	3.08	0.10	23
DRI16	Ease of use of electronic-procurement technology and tools	4.00	0.74	3
DRI17	Number of existing users amongst business partners	4.00	1.16	5
DRI18	Geographical spread of the business activities of my organization	3.17	1.27	22
DRI19	Transparent transaction process	4.25	1.36	1
DRI20	Faster problem solving due to access to real –time information	4.08	0.79	2
DRI21	Reduced staffing levels in procurement	3.75	1.22	11
DRI22	Price reduction in tendering	4.00	0.74	3
DRI23	Enhanced decision making and market intelligence	3.58	1.24	15
DRI24	Increased accuracy of production capacity	3.67	1.15	13
DRI25	Reduced operating and inventory costs	3.42	0.10	18

5.4.3 Benefits of electronic-procurement round three

In the round three Delphi survey, after an affirmation of responses had been done by the panellists, the questionnaire were retrieved and analysed (see Table 5.19),Improved and efficient negotiation was the only item which had a mean value of less than 3.0 under the benefits to clients factor. At the conclusion of the three rounds of the Delphi survey, only Improved and efficient negotiation was said not to have significance to the benefits of electronic-procurement. Thus, this did not form a part of benefits for the final survey questionnaire.

Table 5.19: Benefits of Electronic-procurement Round three

Code	Factors	Mean Item Score	Standard Deviation	Rank
	Benefits to the client			
BCL1	Elimination of intermediaries	3.67	1.30	7
BCL2	Improved and efficient negotiation	2.83	1.19	14
BCL3	Reduced exchange cost	3.33	1.23	9
BCL4	Process shortening	4.00	1.34	3
BCL5	Price reduction	3.75	1.06	6
BCL6	Time reduction	4.00	1.04	4
BCL7	Improved control and communication	3.50	1.24	11
BCL8	Effectiveness and efficiency	4.00	0.85	5
BCL9	Identifying potential sourcing opportunities	3.67	0.98	8
BCL10	Reduced inventory levels	3.25	0.97	12
BCL11	Less paper work	4.25	1.14	1
BCL12	Standardization of processes	4.17	1.11	2
BCL13	Decentralized procurement process	3.33	1.44	10
BCL14	continual usage by organizational employees	3.17	1.19	13
	Benefits to the contractor			
BCO1	Improved customer satisfaction	4.33	0.49	3
BCO2	Improved relationship with other firms	3.58	1.08	14
BCO3	It has an impact on service quality	4.25	0.45	4
BCO4	Work process mechanization	3.83	1.03	10
BCO5	Better transparency and checking	4.25	0.45	4
BCO6	Improved leverage on spending	3.67	0.89	12
BCO7	Reduced influence of bureaucracy	4.33	0.89	1
BCO8	Impact on process capability, productivity and dependability	3.67	0.89	12
BCO9	Immediate availability of information	4.08	0.79	7
BCO10	Minimum duplication	4.00	1.13	8
BCO11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices	3.75	0.97	11
BCO12	Return on investment	3.92	0.51	9
BCO13	It improves communication between buyer and suppliers	4.17	0.58	6
BCO14	provides wider base of buyers and suppliers,	4.33	0.65	2
	Benefits to the public			
BPU1	It has an impact on cost efficiency, customer service	4.33	0.65	3
BPU2	higher organizational performance	4.75	0.45	1
BPU3	Quality outcome	4.33	0.89	2
BPU4	user satisfaction	4.25	1.14	4
BPU5	cost-effective technology which improves public trust	4.25	0.45	5

Table 5.19 contd: Benefits of Electronic-procurement Round three

BPU6	Supply chain integration.	3.50	1.09	10
BPU7	streamlining the ordering process to obtain significant efficiencies	3.67	1.07	7
BPU8	Improvement in internal service quality	3.67	0.98	8
BPU9	Clear and achievable implementation phase	3.58	1.08	9
BPU10	Clear accountability for buying in organizational structure	4.12	0.58	6

5.4.4 Barriers to implementation of electronic-procurement round three

The result in Table 5.20 shows the mean values, standard deviation and rank of barrier items after analysis of the round three Delphi questionnaire. Lack of financial resources (capital),Security in the process - Data transmission to the wrong person,High investment cost,It not being the top initiative or priority of the company, Lack of interoperability and standards with traditional communication systems, Complicated procedures and extended Relationships, Partial Data Display - incomplete documents provided,Clarity of sender and tenderer information, Confidentiality of information – unauthorised viewing, Prevention of tampering with documents -changes to documents, Lack of business relationship with companies providing electronic-procurement and no business benefit realised all had mean values of less than 3.0 which was the set bench mark for significance. Similar responses to those of round two were obtained for the round three. Though the items did not have exact same figures, those items with mean values below 3.0 were same. At the conclusion of the three rounds of the Delphi survey, twelve barrier items had mean values below 3.0 from the responses of the panellists signifying that those twelve factors in their opinion, did not pose as barriers to implementation of electronic-procurement in their organisations.

Table 5.20: Barriers to Implementation of Electronic-procurement Round three

Code	Factors	Mean Item Score	Std. Deviation	Rank
BAR1	Lack of technical knowledge and skills	3.75	1.29	14
BAR2	Lack of financial resources (capital)	1.67	0.78	25
BAR3	Resistance to change	4.08	1.00	5
BAR4	Security in the process - Data transmission to the wrong person	2.33	1.07	17
BAR5	High investment cost	2.33	1.07	17
BAR6	Lack of laws on Electronic-procurement	4.33	0.65	1
BAR7	Investment in electronic devices	4.25	0.62	2
BAR8	Investment in human resource development	3.75	0.97	13
BAR9	Lack of evidence of the benefits of electronic-procurement in the building industry	4.00	1.13	7
BAR10	It not being the top initiative or priority of the company	1.92	0.79	20
BAR11	Lack of interoperability and standards with traditional communication systems	1.75	0.87	24
BAR12	Lack of top management support and commitment	4.00	1.04	6
BAR13	Lack of motivation of people	4.08	0.90	4
BAR14	Resistance to new technology	4.00	0.85	8
BAR15	Complicated procedures and extended Relationships	1.42	0.67	27
BAR16	Partial Data Display - incomplete documents provided	1.75	0.62	21
BAR17	Clarity of sender and tenderer information	1.58	0.79	26
BAR18	Enforceability of electronic contracts	4.00	0.95	9
BAR19	Information technology investment costs	3.92	1.00	10
BAR20	Confidentiality of information – unauthorised viewing	2.42	1.16	16
BAR21	Prevention of tampering with documents -changes to documents	2.33	1.07	17
BAR22	Lack of Flexibility	3.92	1.00	10
BAR23	Lack of business relationship with companies providing electronic-procurement	1.75	0.62	21
BAR24	Slow Internet network connectivity	3.67	0.89	15
BAR25	Expensive internet services in Nigeria	3.83	1.19	12
BAR26	Low rate of internet diffusion	4.25	0.62	2
BAR27	No business benefit realised	1.75	0.62	21

5.4.5 Operational requirements for electronic-procurement implementation round three

In round three Delphi survey, when the questionnaire was re-administered for reaffirmation, supplier assessment had mean value of 2.92 and ranked 20th. When the three rounds of the Delphi were concluded, organisational size and supplier assessment were items which the panellist's opinion suggested were not important as operational factors to the implementation of Electronic-procurement in their organisations and these were not included in the final survey questionnaire (see Table 5.21).

Table 5.21: Operational Requirements for Electronic-procurementImplementation Round three

Code	Factors	Mean Item Score	Standard Deviation	Rank
OPR1	Technological availability	4.08	0.79	2
OPR2	Availability of trained personnel	3.75	0.75	12
OPR3	Infrastructural availability	4.00	0.74	5
OPR4	Organisational willingness	3.92	0.10	10
OPR5	High level of ICT knowledge and skills	4.33	0.89	1
OPR6	Provision of Security, privacy and trust concerns	3.50	1.00	17
OPR7	Financial capability	3.75	1.22	14
OPR8	Good knowledge of electronic-procurement	3.92	0.90	9
OPR9	Availability of training procedure	4.00	1.04	6
OPR10	Employee competence	3.83	0.72	11
OPR11	Management commitment on implementation of electronic-procurement	3.92	1.31	8
OPR12	Appropriate implementation framework	4.00	0.95	7
OPR13	Supplier identification	3.08	0.10	19
OPR14	Supplier assessment	2.92	1.16	20
OPR15	Development and review of procurement strategy	3.42	1.31	18
OPR16	Availability of affordable Internet service in Nigeria	4.08	0.90	3
OPR17	Availability of high speed internet	4.08	1.16	4
OPR18	High rate of internet diffusion	3.67	0.78	15
OPR19	High level of awareness of electronic-procurement	3.58	0.10	16
OPR20	Availability of organisation website	3.75	0.97	13

5.4.6 Potential values that will be derived from electronic-procurement implementation round three

After an analysis of the responses gotten from the round three survey was done, all items had mean values greater than 3.0 which meant they were all considered by the panellists as very important and they were all included in the final survey questionnaire (see Table 5.22).

Table 5.22: Potential Values that will be derived from Electronic-procurement Implementation Round three

Code	Factors	Mean Item Score	Standard Deviation	Rank
POV1	Elimination of paperwork	4.83	0.39	1
POV2	Time reduction	4.42	0.67	5
POV3	Price reduction	4.17	0.83	10
POV4	Transparency	4.67	0.49	2
POV5	Corruption elimination	4.25	0.62	7
POV6	Bureaucracy elimination	4.50	0.67	4
POV7	Standardization of process	4.25	0.75	9
POV8	Process shortening	4.25	0.62	7
POV9	The efficiency of procurement process	4.50	0.52	3
POV10	Exposure to new technologies	3.75	0.75	18
POV11	Closer and more effective relationship between partners	3.08	0.67	21
POV12	Strengthening the trading relationship between different partners	3.00	0.95	24
POV13	Improving product and service quality	3.92	1.08	14
POV14	Fast and efficient procurement process.	4.08	0.79	13
POV15	Reduction in redundant cost	3.17	1.03	23
POV16	Organizational competitiveness	3.33	0.65	22
POV17	Giving rise to innovative ideas	3.92	0.67	16
POV18	Faster arrival of products from the supplier.	3.67	1.07	19
POV19	improving the speed of service	4.17	0.94	11
POV20	quality, reliability and trust	4.08	0.67	12
POV21	Accountability	4.33	0.78	6
POV22	Central coordination and aggregation of demand	3.92	0.67	16
POV23	User satisfaction	3.58	0.79	20
POV24	Improvement in internal service quality	4.00	0.85	15

5.4.7 Conclusions of the delphi survey

After analysis of the round three Delphi survey was done, the results of round two and three were compared since same questionnaire was administered. It was found out that both results were similar. Though not exact same values were obtained, but the similarities were of significance because factors had similar mean values (where values were less than 3.0 were same in both second and third rounds). To further compare the responses from the three rounds of Delphi survey, an analysis of variance (ANOVA) (see appendix D) was carried out, a P value of 0.13 which was higher than 0.05 was obtained. This meant that no statistically significant difference was evident in the panellists' responses across the three rounds.Established on these, it was then said that consensus had been reached.

Consensus is synonymous with agreement, and it is said to be achieved when a group of panellists agree on a set of opinions (Hsu & Sandford, 2007; Holey *et al.,* 2007). Attaining consensus is however very important and as well difficult in a Delphi survey. It is noteworthy that there is no actual agreement on how consensus can be reached in literature regarding a set of opinions (Hsu & Sandford, 2007) According to Holey *et al.* (2007), the following criteria can be used to determine consensus or agreement: an aggregate of judgments, a shift to a subjective level of central tendency, or, alternatively, confirming stability in responses with consistency of answers across successive rounds of the study. In this research, consensus was said to have been achieved when a particular questionnaire was administered twice (in round two and three) and similar responses (in term of mean values) were obtained in both rounds. This is to say that response stability and consistency between successive rounds was obtained. Analysis of the third round was thereby adopted for the final questionnaire survey.

5.5 Final Survey

5.5.1 Analysis of respondents' demography

Descriptive analysis was done for all data collected to ensure data purification before further analyses were carried out. From Table 5.23Participants in the survey were drawn from government ministries and parastatals. Seventy-five (75) respondents came from parastatals, accounting for 51.4% of all respondents, while 71 came from ministries, accounting for 48.6%. Twenty-six respondents (17.8%) held a Higher National Diploma (HND), 50 (34.2%) a BTech/BSc, 65 (44.5%) a Master's degree, 2 (1.4%) a PhD and three (2.1%) Post Graduate Diplomas (PGD). A Master's degree was held by 44% of those polled. 11% of respondents had no to five years of work experience, 30.1% had six to ten years, 27.4% had eleven to fifteen years, and 31.5% had sixteen years or more.

Table 5.23:Respondents' Demography

Demographic Variables	Frequency	Percentage
Organisation		
Parastatal	75	51.4
Ministry	71	48.6
Total	146	100
Education Qualification		
HND	26	17.8
BTech/BSci	50	34.2
Masters	65	44.5
PhD	2	1.4
Others (PGD)	3	2.1
Total	146	100
Years of experience		
0-5	16	11
6-10	44	30.1
11-15	40	27.4
16 above	46	31.5
Total	146	100

5.5.2 Impacts of external variables on implementation of electronic-procurement

The factors for this construct were identified from literature and were categorised into three sub constructs (Technology, people and process).Each of the factors (technology, people and process) had items under them which were presented to the respondents. Responses gotten were analysed descriptively by finding the mean item score, standard deviation and then ranking them. From Table 5.24, Non availability of high speed internet, Non- availability of reliable ICT Infrastructure, Expensive internet services in Nigeria and Low rate of internet diffusion were ranked 1st, 2nd, 3rd and 4th respectively under technology factor which is in line with Nawi *et al.* (2017) that identified challenges to electronic-procurement as technology, infrastructure and legislation while Lack of availability of skilled personnel to handle electronic-procurement tools and processes and Human resource hiring development were ranked 1st and 2nd respectively. For process factor, Political challenges, Electricity supply and Fear to change into a new system were ranked 1st, 2nd and 3rd respectively while Lack of laws was ranked the least 7th). These findings can be ascertained in the findings of McConnell (2009) which stated that technological problems arise principally as a result of inadequate use of technology solution in the procurements process.

Table 5.24: Impacts of External Variables onImplementation of Electronic-procurement

S/NO	Factors	Mean Item Score	Standard Deviation	Rank
	Technology			
TCH1	Non- availability of reliable ICT Infrastructure	3.53	1.29	2
TCH2	Expensive internet services in Nigeria	3.51	1.29	3
TCH3	Low rate of internet diffusion	3.29	1.19	4
TCH4	Non availability of high speed internet	3.62	1.26	1
	People			
PPL1	Human resource hiring development	3.05	1.21	2
PPL2	Lack of availability of skilled personnel to handle electronic-procurement tools and processes	3.24	1.18	1
	Process			
PRO1	Lack of standards	3.27	1.21	5
PRO2	Lack of laws	3.10	1.43	7
PRO3	Political challenges	4.05	1.07	1

PRO4	Electricity supply	3.84	1.35	2
PRO5	Lack of capital	3.23	1.42	6
PRO6	Fear to change into a new system	3.48	1.30	3
PRO7	Non Availability of training procedure	3.47	1.20	4

5.5.3Drivers to the implementation of electronic-procurement

From the Delphi survey twenty three items remained and were presented to the respondents for rating under the driver factor. Items which had high effects from their means are: Less paper work, Perceived benefits associated with reduction in the procurement cost,Reduction in time spent on procurement process,Financial base of organization, Price reduction in tendering were factors which were ranked 1st, 2nd , 3rd and 5thwhile Number of existing users amongst business partners, Faster problem solving due to access to real –time information, Benefits of enhanced level of efficiency in job delivery and Geographical spread of the business activities of my organisation were ranked 20th, 21st, 22nd and 23rd respectively after the means were calculated from the responses received from respondents signifying they were items which had low effects as drivers to electronic-procurement. These findings are similar to those in Eadie *et al.,* (2010) See Table 5.25 for the summary of results.

Table 5.25: Drivers to the Implementation of Electronic-procurement

S/NO	Factors	Mean Item score	Standard Deviation	Rank
DRI1	Availability of IT manpower in the organization	3.50	1.38	19
DRI2	Reduction in errors associated with paper-based methods	3.73	0.98	8
DRI3	Reduction in time spent on procurement process	3.95	1.15	4
DRI4	Less paper work	3.99	1.28	1
DRI5		3.71	1.11	9
DRI6	Availability of electronic-procurement packages	3.51	1.35	18
DRI7	Less labour intensive feature of electronic-procurement	3.71	1.11	9
DRI8	Perceived benefits associated with reduction in the procurement cost	3.97	1.07	2
DRI9	Benefits of enhanced level of efficiency in job delivery	3.32	1.27	22
DRI10	Benefits of elimination of geographic barriers in procurement	3.74	1.16	7
DRI11	Benefits of effective communication between project team members	3.56	1.22	14
DRI12	Compatibility of electronic-procurement with our existing procurement process	3.52	1.26	15
DRI13	Financial base of organization	3.95	1.13	3
DRI14	Ease of use of electronic-procurement technology and tools	3.82	1.39	6
DRI15	Number of existing users amongst business partners	3.45	1.28	20
DRI16	Geographical spread of the business activities of my organization	3.23	1.18	23
DRI17	Transparent transaction process	3.68	1.24	12
DRI18	Faster problem solving due to access to real –time information	3.40	1.23	21
DRI19	Reduced staffing levels in procurement	3.51	1.18	16
DRI20	Price reduction in tendering	3.86	1.06	5
DRI21	Enhanced decision making and market intelligence	3.62	1.23	13
DRI22	Increased accuracy of production capacity	3.71	1.23	11
DRI23	Reduced operating and inventory costs	3.51	1.30	17

5.5.4 Benefits of implementation of electronic-procurement

Benefits to the implementation of Electronic-procurementwas sub-divided into three factors (benefits to clients, benefits to contractors and benefits to the public). The descriptive analysis was done under those factors (Table 5.26). items which were of high significance were: effectiveness and efficiency, Less paper work and Identifying potential sourcing opportunities were ranked 1st, 2nd and 3rd respectively while continual usage by organizational employees was ranked least (13th) for benefits to the client signifying item with low significance. For benefits to contractor's, immediate availability of information,improved customer satisfaction, better transparency and checking and it has an impact on service quality were ranked 1st, 2nd,3rdand 4th while the least ranked was returning to investment which was ranked 14th. For the benefits to the public, quality outcome, it has an impact on cost efficiency, customer service and user satisfaction were ranked topmost 1st, 2nd and third respectively while supply chain integration was ranked 10th which was the least rank of that factor. The findings in this study are line with those of Wen and Wei 2007; Ibem and Laryea, 2015;Aduwo *et al*., 2017 where these items were listed as benefits to implementation of electronic-procurementbut in no particular order.

Table 5.26: Benefits of Implementation of Electronic-procurement

S/NO	Benefits to client	Mean Item Score	Standard Deviation	Rank
BCL1	Elimination of intermediaries	3.87	1.25	7
BCL2	Reduced exchange cost	3.51	1.17	11
BCL3	Process shortening	4.06	1.09	5
BCL4	Price reduction	3.49	1.26	12
BCL5	Time reduction	4.07	1.24	4
BCL6	Improved control and communication	3.77	1.01	9
BCL7	Effectiveness and efficiency	4.33	0.81	1
BCL8	Identifying potential sourcing opportunities	4.12	0.95	3
BCL9	Reduced inventory levels	3.60	1.03	10
BCL10	Less paper work	4.29	0.88	2
BCL11	Standardization of processes	4.03	0.96	6
BCL12	Decentralized procurement process	3.86	1.20	8
BCL13	continual usage by organizational employees	3.44	1.21	13
Benefits to the contractor				
BCO1	Improved customer satisfaction	4.23	0.79	**2**
BCO2	Improved relationship with other firms	3.86	0.91	11
BCO3	It has an impact on service quality	4.02	0.98	4
BCO4	Work process mechanization	3.83	1.02	12
BCO5	Better transparency and checking	4.23	0.95	3
BCO6	Improved leverage on spending	3.68	1.11	13
BCO7	Reduced influence of bureaucracy	3.95	1.10	7
BCO8	Impact on process capability, productivity and dependability	3.88	1.17	9
BCO9	Immediate availability of information	4.27	0.95	1
BCO10	Minimum duplication	3.97	1.16	6
BCO11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices	3.95	1.06	7
BCO12	Returning to investment	3.47	1.11	14
BCO13	It improves communication between buyer and suppliers	3.88	0.87	9

Table 5.26 contd: Benefits of Implementation of Electronic-

BCO14	provides wider base of buyers and suppliers,	3.99	0.91	5
Benefits to the public				
BPU1	It has an impact on cost efficiency, customer service	4.14	0.89	2
BPU2	higher organizational performance	4.06	0.911	5
BPU3	Quality outcome	4.15	0.82	1
BPU4	user satisfaction	4.12	0.84	3
BPU5	cost-effective technology which improves public trust	4.08	1.03	4
BPU6	Supply chain integration.	3.81	1.06	10
BPU7	streamlining the ordering process to obtain significant efficiencies	3.88	0.99	9
BPU8	Improvement in internal service quality	3.97	0.92	6
BPU9	Clear and achievable implementation phase	3.95	0.97	7
BPU10	Clear accountability for buying in organizational structure	3.95	0.97	7

5.5.5Barriers to the implementation of electronic-procurement

The researcher put forth fifteen items to the respondents for rating. The item ratings as presented in Table 5.27highlights the respondents' rating of the items to the extent to which they agreed they were constituting barriers toelectronic-procurement implementation. There was strong agreement toResistance to new technology,Enforceability of electronic contracts and Resistance to change as constituting barriers to electronic-procurement implementation since they had mean values between 4 and 5 and were ranked 1st, 2nd and 3rd respectively while Lack of laws on Electronic-procurement,Lack of Flexibility and Investment in electronic devices were agreed to be least as constituting barriers to electronic-procurement implementation and were ranked least 13th, 14th and 15th respectively. These align with the studies of Rakin *et al.*, 2006; Isikdag *et al.*,2011; Eadie *et al.*,,2011, Bello and Iyagba, 2013; Laryea and Ibem, 2014; and Altayyar, 2017, where all these factors were listed as barriers to Electronic-procurement implementation but were not ranked in any particular order.

Table 5.27: Barriers to the Implementation of Electronic-procurement

S/No	Factors	Mean Item Score	Standard Deviation	Rank
BAR1	Lack of technical knowledge and skills	3.18	1.38	11
BAR2	Resistance to change	4.33	0.82	3
BAR3	Lack of laws on Electronic-procurement	2.92	1.56	13
BAR4	Investment in electronic devices	1.86	0.79	15
BAR5	Investment in human resource development	3.47	1.15	8
BAR6	Lack of evidence of the benefits of electronic-procurement in the building industry	3.29	1.29	10
BAR7	Lack of top management support and commitment	4.32	0.82	4
BAR8	Lack of motivation of people	3.92	1.04	6
BAR9	Resistance to new technology	4.55	0.59	1
BAR10	Enforceability of electronic contracts	4.42	0.60	2
BAR11	Information technology investment costs	3.02	1.39	12
BAR12	Lack of Flexibility	2.84	1.49	14
BAR13	Slow Internet network connectivity	3.51	1.50	7
BAR14	Expensive internet services in Nigeria	3.96	1.19	5
BAR15	Low rate of internet diffusion	3.30	1.25	9

5.5.6 Operational requirementsfor electronic-procurement implementation

Respondents rated the operational requirements for electronic-procurement implementation in Table 5.28 based on their importance. The following were deemed critical and ranked accordingly: First, there must be availability to high-speed internet as well as management commitment to implementing Electronic-procurement. Second, technological availability Supplier identification was ranked 19th, the lowest ranked and rated as less important, while Good knowledge of Electronic-procurement was ranked third.Results in Table 5.28 are in line with some studies likethat of Adil *et al.* (2014).

Table 5.28: Operational Requirements forElectronic-procurement Implementation

S/NO	Factors	Mean item Score	Standard Deviation	Rank
OPR1	Technological availability	4.36	0.77	3
OPR2	Availability of trained personnel	4.27	0.76	7
OPR3	Infrastructural availability	4.32	0.70	5
OPR4	Organisational willingness	4.05	0.96	15
OPR5	High level of ICT knowledge and skills	4.13	0.87	12
OPR6	Provision of Security, privacy and trust concerns	3.94	1.03	17
OPR7	Financial capability	4.15	0.93	11
OPR8	Good knowledge of electronic-procurement	4.33	0.73	4
OPR9	Availability of training procedure	4.10	0.79	14
OPR10	Employee competence	4.17	0.76	10
OPR11	Management commitment on implementation of electronic-procurement	4.41	0.74	2
OPR12	Appropriate implementation framework	4.11	0.88	13
OPR13	Supplier identification	3.57	1.03	19
OPR14	Development and review of procurement strategy	3.94	0.86	16
OPR15	Availability of affordable Internet service in Nigeria	4.27	0.81	8
OPR16	Availability of high speed internet	4.44	0.79	1
OPR17	High rate of internet diffusion	3.83	1.23	18
OPR18	High level of awareness of electronic-procurement	4.30	0.79	6
OPR19	Availability of organisation website	4.20	0.87	9

5.5.7 Potential values that can be derived from effective implementation of electronic-procurement

From Table 5.29, Transparency,Accountability,Time reduction,quality, reliability and trust were ranked 1st, 2nd, 3rd and 4th while strengthening the trading relationship between different partners was the least ranked. Implying that these items all constituted Potential values that can be obtained from effective Implementation of electronic-procurement. The results in table 5.29 are in line with those of Ronchi *et al.* (2010); Mahdillou and Akbary (2014); Korir *et al*. (2015) where the factors were listed as potential values of electronic-procurement implementation.

Table 5.29:Potential Values that can be derived from for Electronic-procurement Implementation

S/No	Factors	Mean Item Score	Standard Deviation	Rank
1	Elimination of paperwork	3.97	1.02	15
2	Time reduction	4.25	0.84	3
3	Price reduction	3.71	1.08	22
4	Transparency	4.42	0.79	1
5	Corruption elimination	4.20	0.92	7
6	Bureaucracy elimination	3.98	1.07	14
7	Standardization of process	4.12	0.83	10
8	Process shortening	4.09	0.92	11
9	The efficiency of procurement process	4.12	0.80	9
10	Exposure to new technologies	4.21	0.74	6
11	closer and more effective relationship between partners	3.77	0.89	19
12	strengthening the trading relationship between different partners	3.65	1.00	24
13	Improving product and service quality	3.95	0.85	16
14	Fast and efficient procurement process.	4.22	0.77	4
15	Reduction in redundant cost	3.77	1.04	20
16	Organizational competitiveness	3.77	1.04	20
17	Giving rise to innovative ideas	3.93	1.00	18
18	Faster arrival of products from the supplier.	3.69	1.01	23
19	improving the speed of service	4.01	0.91	12
20	quality, reliability and trust	4.22	0.91	5
21	Accountability	4.33	0.94	2
22	Central coordination and aggregation of demand	3.95	0.93	17
23	User satisfaction	4.00	0.84	13
24	Improvement in internal service quality	4.16	0.74	8

5.6 Examination of the Underlying Dimensions

Item reduction is carried out to make sure that only prudent, functional, and internally consistent items are eventually included for further examination (Boateng *et al.*, 2018). As a result, the aim of this section is to ascertain items that are not or are only marginally related to the constructs under consideration for suppression.

To begin, the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity were applied to four (4) constructs (drivers, operational requirements, barriers, and effective implementation) to ensure adequate sampling and statistical significance for further analysis (Field, 2013). The KMO value was calculated using the method recommended by Tabachnick and Fidell (2014), Hair *et al* (2010) and Pallant (2011), with a minimum value of 0.5 indicating that the sample is adequate and the Bartlett's test of sphericity is significant at 0 (p 0.005).The KMO values of all four (4) constructs are greater than the minimum value of 0.5, as shown in Table 5.30.The KMO value for Drivers, operational requirements, barriers and effective implementation were 0.864, 0.716, 0.528 and 0.825 respectively, while theBartlett's test of Sphericity were all significant at (p=0.000). Hence, the two tests indicate that the sampling are adequate and can be considered for additional investigation

Table 5.30: KMO and Bartlett's Test of Constructs

KMO and Bartlett's Test	
Drivers	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.864
Bartlett's Test of Sphericity	Significant
Operational Requirements	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.716
Bartlett's Test of Sphericity	Significant
Barriers	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.528
Bartlett's Test of Sphericity	Significant
Effective Implementation	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.825
Bartlett's Test of Sphericity	Significant

Potential factors were extracted using the principal component extraction (PCA) method and the direct Oblimin rotation method. The Kaiser's Criterion, the Scree Plot, and the current gold standard parallel analysis are popular approaches for determining the number of variables to be retained based on the eigenvalues of the correlation matrix

(Braeken &van Assen, 2016). In this study, the Kaiser's Criterion and the Scree Plot approaches were used, which are the most common. The Kaiser's Criterion method prefers factors with eigenvalues greater than one and ignores factors with eigenvalues less than one (Kaiser, 1974; Zaiontz, 2020).A graph of the eigenvalues (y-axis) of all the factors (x-axis) is shown using the Screen Plot approach, with the factors listed in decreasing order of their eigenvalues (appendix G). The heuristic is to keep all factors above the inflection point (where the curve begins to level off) and to remove any factors below the inflection point (Zaiontz, 2020).

Tables5.31, 5.32, 5.33 and 5.34 show the factors extracted for drivers, operational requirements, barriers and potential values respectively, in addition to their Eigenvalues, the percentage of variance explained by each factor, the cumulative variance assigned to each factor, and the communality values (h^2). Furthermore, factor loading retention was performed using the rule of thumb that if a loading is greater than 0.3, the item is relevant for the specific factor. Loadings are also classified as weak if they are less than 0.4 and strong if they are greater than 0.6 (Raykov and Marcoulides, 2011). These rules are arbitrary, and they do not represent a meaningful test. Tabachnick and Fidell (2014) recommended suppressing factor loadings of less than 0.3 and retaining factors with at least three items that do not cross load heavily on other factors. Field (2013) recommended that retained factors have at least three items and do not cross load heavily on other factors.There is a relationship between sample size and acceptable factor loadings, according to Mundfrom *et al.* (2005); Tabachnick and Fidell (2007). Factor loadings are significant at the 0.01 level when they are greater than 0.50 in a sample of 100, greater than 0.30 in a sample of 200, and greater than 0.20 in a sample of 300 (Stevens, 2012). Hair *et al*. (2010) suggested factor loadings of 0.50 for sample sizes ranging from 120 to 149. This study had a sample size of 146 people. As a result, 0.50 was chosen as the retention factor loadings threshold in this study.

5.6.1 Drivers

Table 5.29 shows extracted factors for drivers. Two (2) factors that had eigenvalue greater than1 was extracted from the 23 items for measuring drivers, after eliminating items that had loadings less than 0.5, the rotation process was re-run repeatedly to ensure that items were loaded against only one factor (Field, 2013). The extracted factors became factor 1 and 2 with eigenvalue 5.12 and 1.66 respectively. Factor 1 comprised of 6 items that explained 42.68% of the variance with factor loadings from 0.812 to 0.645 and factor 2 comprised of 6 items that explained 13.84% of the variance with factor loadings from 0.857 to 0.595. Accounting for a total cumulative variance of 56.52% that fell within thecut-off criteria for the rule of thumb set that factors should account for at least 50% of the variance (Streiner, 1994; Hair *et al.,* 2012). The factors extracted were titled process drivers and operational drivers.Process drivers was made up of six items which were increased accuracy of production capacity, transparent transaction process, reduced staffing levels in procurement, efficiency of collaboration amongst project team, reduced operating and inventory costs and electronic-procurement compatibility with our current procurement process. Operational drivers was also made up six items which were benefits of elimination of geographic barriers in procurement, less labour intensive feature of electronic-procurement, ease of use of electronic-procurement technology and tools, reduction in errors associated with paper-based methods, financial base of organisation and less paper work.

Table 5.31: Component Matrix for Drivers

Code	Drivers (items)	Component 1	Component 2	h^2
DRI22	Increased accuracy of production capacity	0.812		0.660
DRI17	Transparent transaction process	0.783		0.629
DRI19	Reduced staffing levels in procurement	0.772		0.522
DRI5	Efficiency of collaboration amongst project team	0.732		0.619
DRI23	Reduced operating and inventory costs	0.692		0.533
DRI12	Compatibility of electronic-procurement with our existing procurement process	0.654		0.463
DRI10	Benefits of elimination of geographic barriers in procurement		0.857	0.634
DRI7	Less labour intensive feature of electronic-procurement		0.760	0.604
DRI14	Ease of use of electronic-procurement technology and tools		0.753	0.657
DRI2	Reduction in errors associated with paper-based methods		0.673	0.525
DRI13	Financial base of organisation		0.623	0.367
DRI4	Less paper work		0.595	0.569
Eigenvalue		**5.121**	**1.661**	
% of variance		**42.68%**	**13.8%**	
Cumulative variance		**42.68%**	**56.5%**	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

5.6.2 Operational requirements

Table5.32 shows extracted factors for operational requirements. Three (3) factors that had eigenvalue greater than 1 was extracted from the 19 items used in measuring operational requirements, after eliminating items that had loadings less than0.5, the rotation process was re-run repetitively to make sure that items were loaded on only one factor (Field, 2013). The extracted factors became factor 1, 2 and 3. Factor 1 had eigenvalue of 3.93 and it comprised of 3 items and contributed 37.67% Factor 2 and 3 have eigenvalues of 1.64 and 1.35, respectively, of the variance with factor loadings ranging from 0.875 to 0.840. Factor 2 consists of three items and accounts for 18.25 percent of the variance with factor loadings ranging from 0.899 to 0.677, while factor 3 consists of four items and accounts for 14.96percent of the variance with factor loadings ranging from 0.875 to 0.659. The three factors explained 70.88% of the total cumulative variance, which is greater than the cut-off criteria of the rule of thumb, which states that retained factors should explain at least 50% of the total variance (Streiner, 1994; Hair *et al.*, 2012). The extracted factors were renamed infrastructure requirements, technological requirements and strategic requirements. Infrastructural requirements were divided into three categories: infrastructural availability, trained personnel availability, and technological availability. Technological requirements included three items: a high rate of internet diffusion, the availability of high-speed internet, and a high level of electronic-procurement awareness, while strategic requirements included three items as well: development and review of procurement strategy, financial capability, and supplier assessment.

Table 5.32: Component Matrix for Operational Requirements

Code	Operational Requirements (items)	Component 1	Component 2	Component 3	h^2
OPR3	Infrastructural availability	0.875			0.726
OPR2	Availability of trained personnel	0.846			0.761
OPR1	Technological availability	0.840			0.820
OPR17	High rate of internet diffusion		0.899		0.713
OPR16	Availability of high speed internet		0.876		0.744
OPR18	High level of awareness of electronic-procurement		0.677		0.565
OPR14	Development and review of procurement strategy			0.875	0.638
OPR7	Financial capability			0.689	0.551
OPR13	Supplier assessment			0.659	0.585
Eigenvalue		**3.39**	**1.64**	**1.35**	
% of variance		**37.67%**	**18.25%**	**14.96%**	
Cumulative variance		**37.67%**	**55.92%**	**70.88%**	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

5.6.3 Barriers

Table 5.33 shows that three (3) factors that has Eigenvalues >1 was extracted from 15 items used in measuring barriers,Factor 1 was able to explain 43.91% of variance, factor 2 explains 27.36% of variance, while factor 3 explains 14.79% of variance. The three factors combine accomplished 86.07% of the total cumulative variance that exceed the cut-off criteria of the rule of thumb that retained factors should explain at least 50 percent of the total variance (Streiner, 1994; Hair *et al*., 2012). Factors 1 had five items loaded on it with loadings from -0.981 to 0.709, factor 2 and 3 had three items loaded on them each with loadings from 0.899 to 0.849 and -0.927 to -0.697 respectively after eliminating items that had loadings less than0.5, the rotation process was re-run repeatedly to make sure that items were loaded onto only one factor (Field, 2013). The factors extracted were then named institutional barriers, process barriers and people barriers.Institutional barriers comprised of five items which were: lack of laws on Electronic-procurement, lack of top management support and commitment, investment in human resource development, investment in electronic devices and lack of Flexibility.

Process barriers comprised of three items namely: expensive internet services in Nigeria, lack of technical knowledge and skills and lack of motivation of people while people barriers comprised also of three items which were: Information technology investment costs, enforceability of electronic contracts and lack of evidence of the benefits of Electronic-procurement in the building industry.

Table 5.33: Component Matrix for Barriers

Code	Barriers (items)	Component 1	2	3	h^2
BAR3	Lack of laws on Electronic-procurement	-0.981			0.966
BAR7	Lack of top management support and commitment	-0.963			0.960
BAR5	Investment in human resource development	-0.906			0.848
BAR4	Investment in electronic devices	0.830			0.792
BAR12	Lack of Flexibility	0.709			0.782
BAR14	Expensive internet services in Nigeria		0.899		0.860
BAR1	Lack of technical knowledge and skills		0.891		0.834
BAR8	Lack of motivation of people		0.849		0.902
BAR11	Information technology investment costs			-0.927	0.960
BAR10	Enforceability of electronic contracts			-0.897	0.790
BAR6	Lack of evidence of the benefits of electronic-procurement in the building industry			-0.697	0.774
Eigenvalue		**4.83**	**3.01**	**1.63**	
% of variance		**43.91**	**27.36**	**14.79**	
Cumulative variance		**43.91**	**71.27**	**86.07**	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

5.6.4 Potential value of effective implementation

Table 5.34 shows that three factors that has Eigenvalues >1 was extracted from 15 items used in measuring potential value of effective implementation,Factor 1 was able to explain 46.04% of variance, factor 2 explains 12.01% of variance, and factor 3 explains 10.75% of variance. The three factors merge together explains a total of 86.07% cumulative variance, which exceeded the cut-off criteria of the rule of thumb that retained factors should explain at least 50 percent of total variance (Streiner, 1994; Hair *et al*., 2012). Factors 1 had three items loaded on it with loadings from 0.868 to 0.774, factor 2 had four items loaded on it with loadings from 0.958 to 0.569 and factor 3 had three items loaded on it with loadings from 0.901 to 0.841 after eliminating items that had loadings <0.5, the rotation process was re-run repeatedly to make sure that items were loaded upon only a factor (Field, 2013). The factors extracted were then named process value, compliance value and strategic values. Process value comprised of three items namely:improving the speed of service, faster arrival of products from the supplier and the efficiency of procurement process. Compliance value had four items which were: accountability, transparency, reduction in redundant cost and user satisfaction while strategic values comprised of three items namely:strengthening the trading relationship between different partners, closer and more effective relationship between partners and giving rise to innovative ideas.

Table 5.34: Component Matrix for Potential Values ofEffective implementation

Code	POV (item)	Component			h^2
		1	2	3	
POV19	Improving the speed of service	0.868			0.753
POV18	Faster arrival of products from the supplier.	0.853			0.789
POV9	The efficiency of procurement process	0.774			0.647
POV21	Accountability		0.958		0.805
POV4	Transparency		0.705		0.635
POV15	Reduction in redundant cost		0.600		0.635
POV23	User satisfaction		0.569		0.649
POV12	strengthening the trading relationship between different partners			0.901	0.839
POV11	closer and more effective relationship between partners			0.841	0.738
POV17	Giving rise to innovative ideas			0.619	0.388
Eigenvalue		**4.60**	**1.20**	**1.08**	
% of variance		**46.04%**	**12.01%**	**10.75%**	
Cumulative variance		**46.04%**	**58.05%**	**68.80%**	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser **Normalization**.

5.7 Hypotheses Testing

Each of the paths of the conceptual framework which had been earlier hypothesised was analysed using correlation and regression to further examine the relationships between the constructs and to also validate earlier findings from literature.

H1: There is a direct relationship between external variables (people, technology and process) and barriersto electronic-procurement.

The relationship between external variables (Technology TCH, people PPL and process PRO) and Barriers was analysed using Pearson correlation analysis. Table 5.35 showed that correlation among the measured variables ranged from 0.001-0.508 and the relationship between external variables and barriers was not significant. .The stronger the relation between the variables, the higher the correlation coefficient. A correlation of 0 indicates that there is no relationship; a correlation of +1.0 indicates that there is a perfect positive relationship; and a correlation of -1.0 indicates that there is a perfect negative relationship (Pallant, 2011& Schober *et al.*,2018).Pallant (2011) further strengthened this by suggesting guidelines as: if r= 0.10 to 0.29 then small, if r= 0.30 to 0.49 then medium and if r= 0.50 to1.0 then large.

None of external variable items (TCH, PPL and PRO) showed a significant relationship with barrier items (institutional barriers, process barriersand people barriers). Technology (TCH) had p value of0.437, 0.446 and 0.279 with institutional Barrier, process barrier and people barriers respectively. People (PPL) had p value of 0.163, 0.156 and 0.213 with institutional, process and people barriers respectively and process had p values of .350, .493 and .301 with institutional, process and people barriers. All P values were above 0.05 which showed that those relationships were not significant. This implies that an upsurge in external variables (technology, people and process) the lesser the barriers in electronic-procurement implementation (see Table 5.35).

Table 5.35: Pearson Correlation Analysis for External Variables and Barriers

	TCH	PPL	PRO	INSTB	PROB	PPLB
TCH	1					
PPL	.378**	1				
PRO	.508**	.324**	1			
INSTB	.013	-.082	.032	1		
PROB	-.011	-.084	.001	.461**	1	
PPLB	.049	-.067	.043	.132	.434**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000). INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers

Tofurther explore the relationship, multiple regressions were performed with external variable factors as predictors and barriers as dependent factors in three different regression analysis (appendix C).Table 5.36 presents the result of the regression analysis. A predictive model was generated from the hypothesis tested.Based on the information available in the surveyed data, the subsequent MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero.

$$Y_{(INSTB)} = \beta_0^{(INSTB)} + \beta_{TCH}^{(INSTB)}(TCH) + \beta_{PPL}^{(INSTB)}(PPL) + \beta_{PRO}^{(INSTB)}(PRO) + \varepsilon$$

$$Y_{(PROB)} = \beta_0^{(PROB)} + \beta_{TCH}^{(PROB)}(TCH) + \beta_{PPL}^{(PROB)}(PPL) + \beta_{PRO}^{(PROB)}(PRO) + \varepsilon$$

$$Y_{(PPLB)} = \beta_0^{(PPLB)} + \beta_{TCH}^{(PPLB)}(TCH) + \beta_{PPL}^{(PPLB)}(PPL) + \beta_{PRO}^{(PPLB)}(PRO) + \varepsilon$$

It was deduced from model 1 the extent to which the external variable factors predicted the barriers to implementation of electronic-procurement in table 5.34. The model had very low predictive power of 1% (R= 0.105; R^2=0.011; F change= 0.528 with P value of 0.664). The result of the model indicated that external variable had no significant relationship with institutional Barriers. Model 2 showed the result of regressing process barriers on the external variables. From Table 5.34, the model has a low predictive power of 0.8% (R=0.090; R^2= 0.008; F change= 0.386 with Pvalue of 0.763). This model also showed no significant relationship. Model 3 showed the result of regressing people Barriers on the external variables. From table 5.34, the model had a very low predictive power of 1.2% (R=0.110; R^2=0.012; F change =0.584 with P value of 0.626).

The results of all the regression analysis in Table 5.36 showed that all the models had very low predictive values and P values above 0.05 which is the threshold for significance. Based on these, hypothesis 1 was rejected. Inferring thatthere is no direct relationship between external variables (people, technology and process) and barriers to electronic-procurement.

Table 5.36:Results of Regression analysis between External Variables and Barriers

Dependent Variables Independent Variables External Variables	INSTB Model 1	PROB Model 2	PPLB Model 3	VIF
Technology	.027	.012	.066	1.447
People	-.109	-.097	-.106	1.199
Process	.054	.027	.044	1.386
R	.105a	.090[a]	.110[a]	
R^2	.011	.008	.012	
ΔF	.528	.386	.584	

Predictors (constant) External variable, Dependent variable Barriers; INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers; VIF = variance inflation factor

H2:there is a direct relationship between external variables and Drivers to electronic-procurement

Table 5.37shows the Pearson's correlation result between external variables and drivers. The relationships all showed to be significant. Furthermore the result showed a significant relationship between external variables and drivers. All relationships were significant having p values less than 0.05 which is the mark for significance. This implies that when there is an improvement in the external variables to the implementation of electronic-procurement, there would be an improvement in the drivers to the implementation of electronic-procurement.

Table5.37: Pearson Correlation Analysis for External Variables and Drivers

	TCH	PPL	PRO	PROD	OPRD
TCH	1				
PPL	.378**	1			
PRO	.508**	.324**	1		
PROD	.339**	.314**	.500**	1	

OPRD	.210*	.276**	.349**	.518**	1

**. Correlation is significant at the 0.01 level (2-tailed, P Value = 0.000). *. Correlation is significant at the 0.05 level (2-tailed, P Value = 0.011). PROD=process Drivers; OPRD= operational Drivers

To predict the degree of effect of external variables on drivers, a regression analysis was carried out (Table 5.38). The subsequent MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero based on the information available in the surveyed data.

$$Y_{(\mathrm{PROD})} = \beta_0^{(PROD)} + \beta_{TCH}^{(PROD)}(TCH) + \beta_{PPL}^{(PROD)}(PPL) + \beta_{PRO}^{(PROD)}(PRO) + \varepsilon$$

$$Y_{(OPRD)} = \beta_0^{(OPRD)} + \beta_{TCH}^{(OPRD)}(TCH) + \beta_{PPL}^{(OPRD)}(PPL) + \beta_{PRO}^{(OPRD)}(PRO) + \varepsilon$$

Model 1 showed the regression analysis between external variables and process drivers, the model had a predictive power of 28.0% (R=0.529, R^2=0.280, F change =18.370 with P value 0f 0.000). Model 2 had a predictive power of 15.2% (R= 0.390, R^2=0.152, F change = 8.480 with p value of 0.000). The results of the analysis showed that the relationship between the constructs were statistically significant since p values were below 0.05. Based on these hypothesis 2 (H2) was accepted. Thus signifying a direct relationship between external variables and drivers to electronic-procurement. Implying that if there is an improvement in external variables, there will also be an improvement in the drivers.

5.38: Results of Regression analysis between External Variable (Technology, People, Process) and Drivers

Independent Variables External Variables	Dependent Variables PROD Model 1		OPRD Model 2	VIF
Technology	.070	-.010		1.447
People	.154	.185		1.199
Process	.415		.295	1.386
R	.529[a]		.390[a]	
R^2	.280		.152	
ΔF	18.370		8.480	

**. Correlation is significant at the 0.01 level (1-tailed). *. Correlation is significant at the 0.05 level (1-tailed).PROD=process Drivers; OPRD= operational Drivers; VIF= variance inflation factor

H3: there is a direct relationship between external variables and benefits to electronic-procurement

Table 5.39 shows the correlation results between external variables and benefit. The relationships were all significant with P values significant at 0.01 except for one relationship which had p value significant at 0.05. Meaning thatas external variables improves, there is also an increase in the benefits that will be derived from electronic-procurement implementation.

Table 5.39 Pearson Correlation Analysis for External Variables and Benefit

	TCH	PPL	PRO	BCL	BCO	BPU
TCH	1					
PPL	.378**	1				
PRO	.508**	.324**	1			
BCL	.324**	.317**	.363**	1		
BCO	.295**	.327**	.470**	.751**	1	
BPU	.154*	.353**	.424**	.643**	.836**	

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000).*. Correlation is significant at the 0.05 level (1-tailed, P Value = 0.032). BCL= benefits to clients; BCO= benefits to contractors; BPU= Benefits to public

Additionally, regression analysis was carried out to predict the degree of effect of external variables on benefits (BCL, BCO and BPU) Table 5.40.This statistically entails fitting the following MLR and testing whether the related regression coefficients were significantly different from zero.

$$Y_{(BCL)} = \beta_0^{(BCL)} + \beta_{TCH}^{(BCL)}(TCH) + \beta_{PPL}^{(BCL)}(PPL) + \beta_{PRO}^{(BCL)}(PRO) + \varepsilon$$

$$Y_{(BCO)} = \beta_0^{(BCO)} + \beta_{TCH}^{(BCO)}(TCH) + \beta_{PPL}^{(BCO)}(PPL) + \beta_{PRO}^{(BCO)}(PRO) + \varepsilon$$

$$Y_{(BPU)} = \beta_0^{(BPU)} + \beta_{TCH}^{(BPU)}(TCH) + \beta_{PPL}^{(BPU)}(PPL) + \beta_{PRO}^{(BPU)}(PRO) + \varepsilon$$

Model 1 which showed regression analysis carried out between external variables and benefits to clients (BCL); the model had a predictive power of 18.9% (R= 0.434; R^2= 0.189; F change= 11.01 with P value of 0.000). The regression between external variables and benefits to contractors (BCO) was shown in model 2. This model had a predictive power of 22.5% (R= 0.505; R^2=0.225;F change=16.19 with P value of 0.000). Model 3 which was between external variables and benefits to Public (BPU). The model had a predictive value of 25% (R=0.500; R^2=0.250; f change 15.80 with P value of 0.000).

The results of all the models shown in Table 5.40 had P values less than 0.05 which made them statistically significant. Based on these the hypothesis (H3) was accepted.

5.40: Results of Regression analysis between External variables (Technology, People, Process) and Benefits

	Dependent variables			
Independent Variables External variables	BCL Model 1	BCO Model 2	BPU Model 3	VIF
Technology	.134	.022	-.164	1.447
People	.191	.190	.280	1.199
Process	.233	.397	.417	1.386
R	.434[a]	.505[a]	.500[a]	
R^2	.189	.225	.250	
ΔF	11.01	16.19	15.80	

Predictors (constant) External variable, Dependent variable Benefits. BCL= benefits to clients; BCO= benefits to contractors; BPU= Benefits to public; VIF = variance inflation factor

H4: there is a direct relationship between barriers to implementation of electronic-procurement and drivers of electronic-procurement

To put this hypothesis to the test, all of the items considered to be included in the model were correlated. Table 5.41 shows the result of the correlation analysis. From the table, INSTB and PROB had no significant relationship with any of the Drivers (process driver and operational driver)except PPLB which had a significant relationship with process driver. Based on this, the correlation was said to be non-significant.Thus, denoting that barriers had no direct relationship on the drivers.

Table 5.41: Pearson Correlation Analysis forBarriers and Drivers

	INSTB	PROB	PPLB	PROD	OPRD
INSTB	1				
PROB	.461**	1			
PPLB	.132	.434**	1		
PROD	.040	.096	.151*	1	
OPRD	.014	.009	-.004	.518**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000).*. Correlation is significant at the 0.05 level (1-tailed, P Value = 0.035).INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers, PROD=process Drivers; OPRD= operational Drivers

Furthermore, to explore the relationships, multiple regressions were carried out table 5.42. This statistically entails fitting the following MLR and testing whether the related regression coefficients were significantly different from zero.

$$Y_{\text{(ProD)}} = \beta_0^{(PROD)} + \beta_{Inst.BArr}^{(PROD)}(INSTB) + \beta_{PRO.BARR}^{(PROD)}(PROB) + \beta_{PPL.BARR}^{(PROD)}(PPLB) + \varepsilon$$

$$Y_{(OPRD)} = \beta_0^{(OPRD)} + \beta_{Inst.BArr}^{(OPRD)}(INSTB) + \beta_{PRO.BARR}^{(OPRD)}(PROB) + \beta_{PPL.BARR}^{(OPRD)}(PPLB) + \varepsilon$$

Model 1 is regression showing the predictive effect of barriers on process driver. The model had a very low predictive value of 2.4%(R=0.154; R^2=0.024; f change = 1.157 with P value 0.329). The second model had a predictive power of 0% (R=0.016; R^2 =0.000; F change =0.013 with P value of 0.998).

From Table 5.42, barriers has no predicting power on drivers of electronic-procurement. Furthermore the models had p values greater than 0.05 signifying the relationship to be non-significant.Implying that anincrease in barriers poses a decrease in drivers of electronic-procurement and vice versa. Based on these, hypothesis (H4) was rejected.

5.42: Results of Regression analysis between Barriers and Drivers

Independent Variables	Dependent Variables PROD Model 1	OPRD Model2	VIF
Barriers			
INSTB	.006	.012	1.278
PROB	.035	.007	1.548
PPLB	.135	-.009	1.241
R	.154[a]	.016[a]	
R^2	.024	.000	
ΔF	1.157	.013	

Predictors (constant) Barriers, Dependent variable Drivers. INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers, PROD=process Drivers; OPRD= operational Drivers; VIF = variance inflation factor

H5: there is direct relationship between drivers to implementation of electronic-procurement and benefits of electronic-procurement.

To put this hypothesis to the test, all of the items considered to be included in the model were correlated. Table 5.43shows the result of the correlation analysis. From the table, it is evident that all correlated items had significant relationships with one another; with process drivers and benefit to client (BCL) having the highest correlation coefficients (0.593 with 0.000 P value). These relationships imply that when there is an improvement in the drivers to Electronic-procurement, then the benefits of electronic-procurement also increases.

5.43: Pearson Correlation Analysis forDrivers and Benefits

	PROD	OPRD	BCL	BCO	BPU
PROD	1				
OPRD	.518**	1			
BCL	.593**	.412**	1		
BCO	.552**	.387**	.751**	1	
BPU	.462**	.425**	.643**	.836**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000). PROD=process Drivers; OPRD= operational Drivers; BCL= benefits to clients; BCO= benefits to contractors; BPU= Benefits to public

Multiple regressions were carried out to further explore the relationships in the hypothesis Table 5.44.The fitted MLR was statistically tested to see if the associated regression coefficients could be claimed to be significantly non-zero given the data presented.

$$Y_{(BCL)} = \beta_0^{(BCL)} + \beta_{proD}^{(BCL)}(PROD) + \beta_{OPRD}^{(BCL)}(OPRD) + \varepsilon$$

$$Y_{(BCO)} = \beta_0^{(BCO)} + \beta_{PROD}^{(BCO)}(PROD) + \beta_{OPRD}^{(BCO)}(OPRD) + \varepsilon$$

$$Y_{(BPU)} = \beta_0^{(BPU)} + \beta_{PROD}^{(BPU)}(PROD) + \beta_{OPRD}^{(BPU)}(OPRD) + \varepsilon$$

Model 1 shows the predictive power of drivers on benefits to client. The model had a predictive power of 36.7% (R=0.606; R^2=0.367; f change=41.11 with P value 0.000). The second model was a regression between Drivers and benefits to contractors (model 2); the model had a predictive power of 31.9% (R=0.565; R^2=0.319; F change= 33.49 with P value 0.000). Model 3 showed the relationship between drivers and benefits to public with predictive power of 26.1% (R=0.511; R^2=0.261; F change= 25.21 with P value of 0.000).

From all the models in the regression analysis P values were less than 0.05 which were all said to be significant.Implying that as drivers increases, benefits to the implementation of electronic-procurement also increases. Based on this, hypothesis 5 was accepted.

5.44: Results of Regression analysis between Drivers and Benefits

	Dependent variables			
Independent Variable	BCL	BCO	BPU	
	Model 1	Model 2	Model 3	VIF
Drivers				

PROD	.519	.481	.3301.366	
OPRD	.143	.138	.254	1.366
R	.606**	.565**	.511**	
R^2	.367	.319	.261	
ΔF	41.44	33.49	25.21	

Predictors (constant) Drivers, Dependent variable Benefits. **p<0.01 PROD=process Drivers; OPRD= operational Drivers; BCL= benefits to clients; BCO= benefits to contractors; BPU= Benefits to public

H6: There is positive relationship between benefits of electronic-procurement and operational requirements of electronic-procurement

The items for inclusion in the model were correlated to test hypothesis six (H6). The correlation result is shown in Table 5.45. The table shows that all items had significant positive relationships with P values significant at 0.01 and 0.05. Thus insinuating that as the benefits of electronic-procurement implementation improves, the operational requirements will also be improved.

Table 5.45: Pearson Correlation Analysis forBenefits and Operational Requirements

	BCL	BCO	BPU	INFR	TECHR	STRR
BCL	1					
BCO	.751**	1				
BPU	.643**	.836**	1			
INFR	.352**	.319**	.276**	1		
TECHR	.186*	.164*	.179*	.246**	1	
STRR	.370**	.446**	.394**	.368**	.301**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000 and 0.01). *. Correlation is significant at the 0.05 level (1-tailed, P Value = 0.012 and 0.024).BCL= benefits to clients; BCO= benefits to contractors; BPU= Benefits to public;INFR= Infrastructural requirements, TECHR= Technological requirements; STRR = strategic requirements

Additionally, multiple regressions were carried to further explore the relationship in this hypothesis (H6) Table 5.46.That is,the fitted MLR was statistically tested to see if it could be claimed to be significantly non-zero given the information presented in the surveyed data.

$$Y_{(INFR)} = \beta_0^{(INFR)} + \beta_{BCL}^{(INFR)}(BCL) + \beta_{BCO}^{(INFR)}(BCO) + \beta_{BPU}^{(INFR)}(BPU) + \varepsilon$$

$$Y_{(TECHR)} = \beta_0^{(TECHR)} + \beta_{BCL}^{(TECHR)}(BCL) + \beta_{BCO}^{(TECHR)}(BCO) + \beta_{BPU}^{(TECHR)}(BPU) + \varepsilon$$

$$Y_{(STRR)} = \beta_0^{(STRR)} + \beta_{BCL}^{(STRR)}(BCL) + \beta_{BCO}^{(STRR)}(BCO) + \beta_{BPU}^{(STRR)}(BPU) + \varepsilon$$

Model 1 in Table 5.46 had a predictive power of 13.1% (R=0.362; R^2=0.131; F change= 7.139 with P value of 0.000). Model 2 had a predictive power of 4.1% (R=0.203; R^2=0.041; F change=2.039 with P value of 0.111). Model 3 had a predictive power of 20.3% (R=0.451; R^2=0.203; F change=12.076 with P value of 0.000).

Looking at the results of the three models, it was seen that two of the regression analysis had P values less than 0.05 and only one of the regressions had P value above 0.05. Based on these the hypothesis H6 was accepted.

Table 5.46:Results of Regression analysis between Benefits and Operational Requirements

Independent Variables	Dependent Variables INFR Model 1	TECHR Model 2	STRR Model 3	VIF
Benefits				
BCL	.258	.140	.077	2.297
BCO	.110	-.053	.334	4.477
BPU	.018	.133	.066	3.330
R	.362[a]	.203[a]	.451[a]	
R^2	.131	.041	.203	
ΔF	7.139	2.039	12.076	

Predictors (constant) Benefits, Dependent variable operational requirements. .BCL= Benefits to client BCO= benefits to contractors; BPU= Benefits to public. INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements

H7: there is positive relationship between drivers and operational requirements

To test this hypothesis, the items to be included in the model were also correlated. The correlation analysis is shown in Tables 5.47. The table revealed that there was significant relationship between driver and operational requirements since all items correlated had significant relationships with P values less than 0.05. This result connotes that when there is an improvement in the drivers to electronic-procurement implementation, the operational requirements are also improved.

Table 5.47: Pearson Correlation Analysis for Drivers and Operational Requirements

	INFR	TECHR	STRR	PROD	OPRD
INFR	1				
TECHR	.246**	1			
STRR	.368**	.301**	1		
PROD	.212**	.169*	.324**	1	
OPRD	.275**	.154*	.139*	.518**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000- 0.005).*. Correlation is significant at the 0.05 level (1-tailed, P Value = 0.021 and 0.047).INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements; PROD=process Drivers; OPRD= operational Drivers.

To further explore the relationships between drivers and operational requirements, regression analysis was carried out Table 5.48. Operational requirements was made the dependent variable while external variables were made the independent.Based on the information available in the surveyed data, the subsequent MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero.

$$Y_{(INFR)} = \beta_0^{(INFR)} + \beta_{PROD}^{(INFR)}(PROD) + \beta_{OPRD}^{(INFR)}(OPRD) + \varepsilon$$

$$Y_{(TECHR)} = \beta_0^{(TECHR)} + \beta_{PROD}^{(TECHR)}(PROD) + \beta_{OPRD}^{(TECHR)}(OPRD) + \varepsilon$$

$$Y_{(STRR)} = \beta_0^{(STRR)} + \beta_{PROD}^{(STRR)}(PROD) + \beta_{OPRD}^{(STRR)}(OPRD) + \varepsilon$$

Model 1 had a predictive power of 8.2% (R=0.287; R^2 =0.082; F change=6.420 with P value of 0.002). Model 2 had a predictive power of 3.5% (R=0.186; R^2=0.035; F change

=2.563 with p value of 0.081) while model 3 had a predictive power of 10.6% (R=0.326; R^2=0.106; F change =8.474 with p value of 0.000).

From the analysis, it was evident that two of the relationships were significant having p values less than 0.05 while one of the relationships was not significant. Based on these, the relationship was thus said to be significant and the hypothesis H7 was thereby accepted.

Table 5.48: Results of Regression analysis between Drivers and Operational Requirements

Independent Variables	Dependent Variables INFR Model 1	 TECHR Model 2	 STRR Model 3	 VIF
Drivers				
Process Drivers	.095	.121	.3441.366	
Operational Drivers	.226	.092	-.0391.366	
R	.287[a]	.186[a]	.326[a]	
R^2	.082	.035	.106	
ΔF	6.420	2.563	8.474	

Predictors (constant) Benefits, Dependent variable operational requirements. INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements; PROD=process Drivers; OPRD= operational Drivers; VIF = variance inflation factor

H8: There is positive relationship between barriers of electronic-procurement and operational requirements of Electronic-procurement

Table5.49shows the result of the correlation analysis between barriers and operational requirements. It is evident that INSTB had no statistical significant relationship between operational requirements, PROB had statically significant relationship with only INFR while PPLB had no statistical significant relationship with operational requirement INFR, TECHR and STRR).Based on the foregoing, it can be said conclusively that there is no statistically significant relationship between barriers and operational requirements for Electronic-procurement implementation in the Nigerian public construction sector. Thus implying that, barriers has no direct influence on operational requirement.

Table 5.49: Pearson Correlation Analysis for Barriers and Operational Requirement

	INSTB	PROB	PPLB	INFR	TECHR	STRR
INSTB	1					
PROB	.461**	1				
PPLB	.132	.434**	1			
INFR	-.139	-.197*	.007	1		
TECHR	-.014	.015	-.036	.246**	1	
STRR	-.035	.021	-.031	.368**	.301**	1

**. Correlation is significant at the 0.01 level (2-tailed, P Value = 0.000 – 0.003).*. Correlation is significant at the 0.05 level (2-tailed, P Value = 0.017). INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers; INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements

To further explore the relationships between Barriers and operational requirements, a regression analysis was carried out (see Table 5.50). Operational requirements were made dependent while barriers were made independent. Based on the information available in the surveyed data, the subsequent MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero.

$$Y_{(INFR)} = \beta_0^{(INFR)} + \beta_{INSTB}^{(INFR)}(INSTB) + \beta_{PROB}^{(INFR)}(PROB) + \beta_{PPLB}^{(INFR)}(PPLB) + \varepsilon$$

$$Y_{(TECHR)} = \beta_0^{(TECHR)} + \beta_{INSTB}^{(TECHR)}(INSTB) + \beta_{PROB}^{(TECHR)}(PROB) + \beta_{PPLB}^{(TECHR)}(PPLB) + \varepsilon$$

$$Y_{(STRR)} = \beta_0^{(STRR)} + \beta_{INSTB}^{(STRR)}(INSTB) + \beta_{PROB}^{(STRR)}(PROB) + \beta_{PPLB}^{(STRR)}(PPLB) + \varepsilon$$

The predictive power of Model 1 was5.1% (R= 0.227, R^2=0.051, F change= 2.562 with p value of 0.057); predictive power of model 2 was 0.3% (R=0.056, R^2=0.003, F change =.003 with p value of 0.930); model 3 had a predictive power of 0.5% (R=0.073, R^2=0.005 F change =0.251 with p value of 0.861). From the results of the models (1, 2 and 3) all p values were greater than 0.05showing that the relationships were not statistically significant. Based on these the hypothesis H8 was thus rejected.

Table 5.50: Results of Regression analysis between Barriers and Operational Requirements

	Dependent Variables			
Independent Variables	INFR Model 1	TECHR Model 2	STRR Model 3	VIF
Barriers				
INSTB	-.052	-.031	-.061	1.278
PROB	-.220	.053	.072	1.548
PPLB	.110	-.055	-.054	1.241
R	.227a	.056a	.073a	
R^2	.051	.003	.005	
ΔF	2.562	.003	.251	

Predictors: (Constant), Barriers= INSTB, PROB, PPLB, Dependent variable operational requirements. INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers; INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements; VIF = variance inflation factor

H9: there is positive relationship between operational requirements and effective implementation

To test hypothesis nine (H9), the items which would be included in the model were correlated to see the relationships. The result of the correlation is given in Table 5.51. In Table 5.51, all correlations showed significant relationships having significant P values at 0.01 and 0.05 meaning they were all significant. Thus implying that if there is an improvement in the operational requirements for Electronic-procurement implementation then, the potential values that will be achieved in effective implementation tends to improve (increase).

Table 5.51: Pearson Correlation Analysis for Operational Requirement and Effective Implementation

	PROV	COMV	STRV	INFR	TECHR	STRR
PROV	1					
COMV	.533**	1				
STRV	.585**	.573**	1			
INFR	.337**	.262**	.290**	1		
TECHR	.205**	.142*	.162*	.246**	1	
STRR	.415**	.426**	.506**	.368**	.301**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000 – 0.007).*. Correlation is significant at the 0.05 level (1-tailed, P Value = 0.025 and 0.044).PROV= Process Value; COMV=Compliance Value; STRV= Strategic Value; INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements; VIF = variance inflation factor

To furtherexplore the relationship between operational requirements and effective implementation, a multiple regression analysis was carried out (Table 5.52). In the analysis, effective implementation was made the dependent while operational requirement was made the independent. The subsequent MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero based on the information available in the surveyed data.

$$Y_{(PROV)} = \beta_0^{(PROV)} + \beta_{INFR}^{(PROV)}(INFR) + \beta_{TECHR}^{(PROV)}(TECHR) + \beta_{STRR}^{(PROV)}(STRR) + \varepsilon$$

$$Y_{(COMV)} = \beta_0^{(COMV)} + \beta_{INFR}^{(COMV)}(INFR) + \beta_{TECHR}^{(COMV)}(TECHR) + \beta_{STRR}^{(COMV)}(STRR) + \varepsilon$$

$$Y_{(STRV)} = \beta_0^{(STRV)} + \beta_{INFR}^{(STRV)}(INFR) + \beta_{TECHR}^{(STRV)}(TECHR) + \beta_{STRR}^{(STRV)}(STRR) + \varepsilon$$

Model has a predictive power of 21.4% (R=0.463, R^2= 0.214, F change = 12.909 with p value of 0.000); model 2 had a predictive power of 19.4% (R=0.441, R^2= 0.194, F change =11.421 with p value of 0.000); model 3 had a predictive power of 26.8% (R=

0.518, R^2= 0.268, F change = 17.369 with p value of 0.000). From the results of the three models, the p values were 0.000 which were all less than 0.05; thus signifying that all relationships were statistically significant. Based on these the hypothesis H9 was accepted.

Table 5.52: Results of Regression analysis betweenOperational Requirements and Effective Implementation

Dependent Variables Independent Variables	PROV Model 1	COMV Model2	STRV Model3	VIF
Operational Requirement				
INFR	.204	.122	.121	1.184
TECHR	.058	-.004	.007	1.126
STRR	.322	.382	.464	1.224
R	.463[a]	.441[a]	.518[a]	
R^2	.214	.194	.268	
ΔF	12.909	11.421	17.369	

Predictors (constant) operational requirements, Dependent variable effective implementation.**. Correlation is significant at the 0.01 level (1-tailed).*. Correlation is significant at the 0.05 level (1-tailed).PROV= Process Value; COMV=Compliance Value; STRV= Strategic Value; INFR= Infrastructural requirements, TECHR= Technological requirements; STRR= strategic requirements; VIF = variance inflation factor

H10: There is a direct positive relationship between benefits and effective implementation of electronic-procurement

When all items for inclusion on the model were correlated to see the relationship in this hypothesis (Table 4.51), the correlated result in Table 5.53 showed that all items in the model had positive significant relationships with one another. All correlations were significant at 0.01 level. These relationships implied that when the benefits to the implementation of electronic-procurement improves, then potential values that would be gained by effective implementation also improves.

Table 5.53: Pearson Correlation Analysis for Benefits and Potential Value of Effective Implementation

	BCL	BCO	BPU	PROV	COMV	STRV
BCL	1					
BCO	.751**	1				
BPU	.643**	.836**	1			
PROV	.414**	.487**	.385**	1		
COMV	.361**	.460**	.484**	.533**	1	
STRV	.461**	.490**	.491**	.585**	.573**	1

**. Correlation is significant at the 0.01 level (1-tailed, P Value = 0.000).BCL= Benefits to client BCO= benefits to contractors; BPU= Benefits to public; PROV= Process Value; COMV=Compliance Value; STRV= Strategic Value

Furthermore, to explore the relationship, multiple regressions were carried out Table 5.54. This was carried out to test the predictive ability of benefit measures on effective implementation measures. That is, the following MLR was fitted, and the associated regression coefficients were statistically tested to determine whether they could be claimed to be significantly non-zero given the information presented in the surveyed data.

$$Y_{(PROV)} = \beta_0^{(PROV)} + \beta_{BCL}^{(PROV)}(BCL) + \beta_{BCO}^{(PROV)}(BCO) + \beta_{BPU}^{(PROV)}(BPU) + \varepsilon$$

$$Y_{(COMV)} = \beta_0^{(COMV)} + \beta_{BCL}^{(COMV)}(BCL) + \beta_{BCO}^{(COMV)}(BCO) + \beta_{BPU}^{(COMV)}(BPU) + \varepsilon$$

$$Y_{(STRV)} = \beta_0^{(STRV)} + \beta_{BCL}^{(STRV)}(BCL) + \beta_{BCO}^{(STRV)}(BCO) + \beta_{BPU}^{(STRV)}(BPU) + \varepsilon$$

Model 1had a predictive power of 24.5% (R=0.494; R^2=0.245; F change =15.319 with P value of 0.00). Model 2 had a predictive power of 24.5% (R=0.495; R^2=0.245; F change =15.333 with P value of 0.000) while model 3 had a predictive power of 28.0% (R=0.530; R^2=0.280; F change =18.451 with P value of 0.000).

All the models in Table 5.54 had P values of 0.000 which were all less than 0.05; showing significance of the relationships. Based on these the hypothesis (H10) was thus accepted.

Table 5.54: Results of Regression analysis between Benefits and Potential Values of Effective Implementation

	Dependent Variables			
Independent Variables	PROV	COMV	STRV	
Benefits	Model 1	Model 2	Model 3	VIF
Benefit client	.115	.026	.206	2.297
Benefit contractor	.467	.165	.117	4.477
Benefit public	-.079	.330	.262	3.330
R	.494[a]	.495[a]	.530[a]	
R^2	.245	.245	.280	
ΔF	15.319	15.333	18.451	

Predictors (constant) Benefits, Dependent variable effective implementation. BCL= Benefits to client BCO= benefits to contractors; BPU= Benefits to public; PROV= Process Value; COMV=Compliance Value; STRV= Strategic Value; VIF = variance inflation factor

H11: There is a direct relationship between barriers and potential values of effective implementation

The itemsfor inclusion in this model were correlated to see their relationships (Table 5.55). From the table, it can be seen that barriers (INSTB, PROB and PPLB) had no significant relationship with any of the potential values (PROV, COMV and STRV). Based on this result, the relationship was said to be non-significant. Denoting that anupsurge in barriers causes a downturn in potential values of effective implementation.

Table 5.55 Pearson's Correlations Analysis for Barriers and Potential Values of Effective Implementation

	INSTB	PROB	PPLB	PROV	COMV	STRV
INSTB	1	.				
PROB	.461**	1				
PPLB	.132	.434**	1			
PROV	-.012	.095	.160	1		
COMV	-.070	.142	.153	.532**	1	
STRV	-.018	.125	.104	.485**	.502**	1

**. Correlation is significant at the 0.01 level (2-tailed, P Value = 0.000). INSTB=institutional Barriers; PROB= process Barriers; PPLB= people Barriers; PROV= Process Value; COMV=Compliance Value; STRV= Strategic Value; VIF = variance inflation factor

To further explore the relationships, multiple regressions were carried out table 5.56. Barriers was made the independent variable while potential values of effective implementation was made the dependent variable. This statistically entails fitting the following MLR and testing whether the related regression coefficients were significantly different from zero.

$$Y_{(PROV)} = \beta_0^{(PROV)} + \beta_{INSTB}^{(PROV)}(INSTB) + \beta_{PROB}^{(PROV)}(PROB) + \beta_{PPLB}^{(PROV)}(PPLB) + \varepsilon$$

$$Y_{(COMV)} = \beta_0^{(COMV)} + \beta_{INSTB}^{(COMV)}(INSTB) + \beta_{PROB}^{(COMV)}(PROB) + \beta_{PPLB}^{(COMV)}(PPLB) + \varepsilon$$

$$Y_{(STRV)} = \beta_0^{(STRV)} + \beta_{INSTB}^{(STRV)}(INSTB) + \beta_{PROB}^{(STRV)}(PROB) + \beta_{PPLB}^{(STRV)}(PPLB) + \varepsilon$$

Model 1 had a predictive power of 2.9% (R= 0.171; R^2= 0.029; F change = 1.422 with P value of 0.239). Model 2 had a predictive strength of 5.1% (R= 0.227; R^2= 0.051; F change = 2.568with P value of0.057) while model 3 had a predictive strength of 2.5% (R= 0.159; R^2= 0.025; F change = 1. 229 with P value of 0.302).

From above, it was evident that none of the relationships was significant. The hypothesis H11 was thereby rejected.

Table 5.56: Results of Regression analysis betweenBarriers and Potential Values of Effective Implementation

Independent Variables Barriers	Dependent Variables PROV Model 1	COMV Model 2	STRV Model 3	VIF
INSTB	-.060	-.207	-.092	1.278
PROB	.044	.155	.102	1.548
PPLB	.112	.096	.041	1.241
R	.171[a] .227[a]		.159[a]	
R^2	.029	.051	.025	
ΔF	1.422	2.568	1.229	

a. Predictors: (Constant) Barriers (PPLB= people barriers, INSTB= institutional barriers, PROB= process barriers), Dependent Variable potential values of effective implementation (PROV= process values, COMV= compliance values, STRV= strategic values; VIF = variance inflation factor

H12: There is an indirect relationship between the external variables and effective implementation of electronic-procurement.

In testing this hypothesis (H12), the items to be included in the model were correlated to see the relationships (Table 5.57). It is evident in Table 5.54that the relationships between each of the external variables (TCH, PPL and PRO) all showed significant relationship with drivers, operational requirements and effective implementation while none of the external variables showed significant relationship with barriers. As can be seen, nine of the twelve relationships were significant, while only three were not. Based on these findings, it wasconclude that there is a significant indirect relationship between external variables and effective implementation.

Table 5.57:Pearson Correlation Analysis for External Variables and Potential Values of Effective Implementation

	TCH	PPL	PRO	Barriers	Drivers	operational	Potential values of Effective implementation
TCH	1						
PPL	.378**	1					
PRO	.508**	.324**	1				
Barriers	.021	-.102	.032	1			
Drivers	.315**	.339**	.488**	.080	1		
Operational	.211*	.242**	.387**	-.075	.330**	1	
Potential values of effective Implementation	.027	.179*	.232**	.108	.254**	.491**	1

**. Correlation is significant at the 0.01 level (2-tailed, P Value = 0.000).*. Correlation is significant at the 0.05 level (2-tailed, P Value 0.011).TCH=Technology; PPL=People; PRO= Process

Multiple regressions were carried out to further explore the degree to which external variables could predict effective implementation Table 5.58. Barriers, drivers, operational requirements and potential values derived from effective implementation were made dependent variables while external variables (TCH, PPL and PRO) were made independent variables. Based on the information presented in the surveyed data, the following MLR was fitted, and the associated regression coefficients were statistically tested to see if they could be claimed to be significantly non-zero.

$$Y_{(Barriers)} = \beta_0^{(Barriers)} + \beta_{TCH}^{(Barriers)}(TCH) + \beta_{PPL}^{(Barriers)}(PPL) + \beta_{PRO}^{(Barriers)}(PRO) + \varepsilon$$

$$Y_{(Drivers)} = \beta_0^{(Drivers)} + \beta_{TCH}^{(Drivers)}(TCH) + \beta_{PPL}^{(Drivers)}(PPL) + \beta_{PRO}^{(Drivers)}(PRO) + \varepsilon$$

$$Y_{(Opr.\ Reqmts)} = \beta_0^{(Opr.Reqmts)} + \beta_{TCH}^{(Opr.Reqmts)}(TCH) + \beta_{PPL}^{(Opr.Reqmts)}(PPL) + \beta_{PRO}^{(Opr.Reqmts)}(PRO) + \varepsilon$$

$$Y_{(Eff.\ \mathrm{impl})} = \beta_0^{(Eff.\mathrm{impl})} + \beta_{TCH}^{(Eff.\mathrm{impl})}(TCH) + \beta_{PPL}^{(Eff.\mathrm{impl})}(PPL) + \beta_{PRO}^{(Eff.\mathrm{impl})}(PRO) + \varepsilon$$

Model 1 had a predictive power of 9.3% (R=0.306; R^2=0.093; F change =4.878 with P value of 0.496). Model 2 had a predictive power of 5.8% (R=0.241; R^2=0.058; F change =2.920 with P value of 0.000). Model 3 had a predictive power of 5.5% (R=0.235; R^2=0.055; F change =2.762 with P value of 0.000) while model four had a predictive power of 8.5% (R= 0.292; R^2= 0.085; F change= 4.402 with p value of 0.005). All four models had P values less than 0.05 displaying that they all had significant relationships. Based on these the hypothesis H12 was accepted.

Table 5.58: Results of Regression analysis betweenExternal variables and Potential Values ofEffective Implementation

Independent Variables External Variables	Dependent Variables Barriers Model 1	Drivers Model 2	Operational req Model 3	Effective implementation Model4	VIF
Technology	.046	.035	-.019	-.167	1.447
People	-.137	.194	.135	.156	1.199

Process	.053	.407	.353	.266	1.386
R	.129	.525	.406	.292	
R^2	.017	.275	.165	.085	
ΔF	.799	17.990	9.352	4.402	

Predictors (constant) external variables, Dependent variable Barriers, Drivers, operational requirement and effective implementation. TCH=Technology; PPL=People; PRO= Process; VIF = variance inflation factor

5.8 Summary of the Regression Analysis

This segment presents the results of all regression analysis carried out to explore the relationships between the constructs. The relationship between the external variables and barriers had P values of 0.664, 0.763 and 0.626 which were all greater than 0.05. This relationship was thus said to be non-significant and hypothesis H1 was thus rejected. The relationship between external variables and drivers had P values of 0.000in all the explored relationships which were all lower than 0.05 and the relationship was thus said to be significant and the hypothesis H2 was accepted.When the relationship between external variables and benefits was explored, the P values obtained were 0.000 all through the models and the relationship was said to be significant and hypothesis H3 was accepted.

For the relationship between barriers and drivers, the models had p values of 0.329 and 0.998 which were greater than 0.05 and this relationship was said to be non-significant; the hypothesis H4 was thereby rejected. In exploring the relationship between drivers and benefits of electronic-procurement, the models had P values of 0.000which were less than 0.05 implying that the relationship was statistically significant and the hypothesis H5 was thus accepted. The relationship between benefits and operational requirements had p values of two of the relationships to be less than 0.05 at 0.000 while one of the relationships had p value of 0.111. The relationship was thus said to be significant and the hypothesis H6 was accepted.

After exploring the relationship between drivers and operational requirements, p values of 0.002, 0.081 and 0.000. Two of the relationships had p values less than 0.05 while one had p value higher. The relationship was thus said to be significant and hypothesis H7 was accepted.

When the relationship between barriers and operational requirements were explored, the relationships had p values of 0.057, 0.930 and 0.861 which were all greater than 0.05; the relationship was thus said to be non-significant and hypothesis H8 was rejected. The relationship between operational requirements and effective implementation had p values of 0.000 all through the models. Based on this, the relationship was said to be significant and hypothesis H9 was accepted.

In exploring the relationship between benefits and effective implementation, the relationships had p values of 0.000 in all models. The relationship was said to be significant and hypothesis H10 was accepted. When the relationship between barriers and potential values of effective implementation (H11) was explored, P values of 0.239, 0.057 and 0.302 were obtained. These values were all greater than the 0.05 cutoff signifying that the relationship was not significant. The hypothesis H11 was thus rejected. Relationship between external variables and barriers and drivers and operational requirements and potential values of effective implementation (H12) was explored and p values of 0.496, 0.000, 0.000 and 0.005. Three of the models had p values less than 0.05 while one of the p values was greater than 0.05. The relationship was said to be significant and the hypothesis was thereby accepted. These can be seen in Table 5.59

Table 5.59: Summary of Regression analysis

Hypothesis	Path relationship	Decision
H1	External variables → Barriers	Rejected
H2	External variables → Drivers	Accepted
H3	External variables → Benefit	Accepted
H4	Barriers → Drivers	Rejected
H5	Drivers → Benefit	Accepted
H6	Benefit → Operational requirement	Accepted
H7	Drivers → Operational requirement	Accepted
H8	Barriers → Operational requirement	Rejected
H9	Operational requirement → Effective implementation	Accepted
H10	Benefit → Effective implementation	Accepted
H11	Barriers → potential values of Effective implementation	Rejected
H12	External variables → Barriers → Drivers → Operational requirement → potential values of Effective implementation	Accepted

5.9 Model Development and Validation

This section highlights the results of Electronic-procurement implementation model for public construction sector in Abuja, using partial least square structural equation model (PLS-SEM). PLS-SEM has two stages of explanation and assessment. First stage includes the assessment of the measurement model which also known as the outer model (Henseler *et al*., 2016), through psychometric reliability and validity tests (convergent validity and discriminant validity). These reliability and validity results provided the link that exists between the measurement items and the constructs they intended to measure. This stage involved inspection of the indicator reliability of the measurement items by assessing the values of the item loading to see if each item in their respective construct meets the set cut-off value.

The second stage involves the assessment of the structural model which is also known as the inner model (Henseler *et al*., 2016). This stage indicated the connection (links) between the constructs, to see if the calculated values all meet their acceptable cut-off value. Collinearity, significance and relevance of the model relationship (path coefficient), predictive relevance, effect size and model fit indices were all assessed in the stage.

5.9.1 Measurement model assessment

The measurement model (outer model) was evaluated using Smart PLS software (Version 3.3.2). The convergent and discriminant validity of the measurement model were evaluated. Convergent validity was assessed using factor loadings, composite reliability (CR), and average variance extracted (AVE) (Hair *et al*., 2014; Hair *et al.*, 2017). Hair *et al.* (2017) propose three criteria for determining discriminant validity: the cross-loadings criterion, the Forner-Lacker criterion, and the heterotrait monotrait (HTMT) correlation ratio.

Retention of item loading criteria, according to Henseler *et al* (2015) item should have loading > 0.70 and also suggested that item loadings < 0.70 are to be dropped from their respective constructs. However, for this study item loading of > 0.70 was employed. Therefore, the item institutional (INST) and technology requirement (TCHR) were dropped from their construct for having loading < 0.70. After dropping the items that had low loading value for explaining their constructs.Smart PLS software was used to evaluate the measurement model (outer model) (Version 3.3.2). The measurement model's convergent and discriminant validity were assessed. Factor loadings, composite reliability (CR), and average variance extracted (AVE) were used to assess convergent validity (Hair *et al.*, 2014; Hair *et al*., 2017). Hair *et al.* (2017) propose three discriminant validity criteria: the cross-loadings criterion, the Forner-Lacker criterion, and the heterotrait monotrait (HTMT) correlation ratio.

Table: 5.60:Validity and Reliability of Construct(measurement model)

Constructs	**Items**	**Item Loadings**	**AVE**	**CR**
Barriers	PPLB	0.847	0.717	0.835
	PROB	0.847		
Benefit	BCL	0.877	0.830	0.936
	BCO	0.950		
	BPU	0.905		
Drivers	PROD	0.911	0.755	0.860
	OPRD	0.824		
Potential value of effective implementation	COMV	0.827	0.709	0.880
	PROV	0.836		
	STRV	0.863		
External variable	PPLE	0.703	0.599	0.817
	PROE	0.844		
	TCHE	0.769		
Operational requirement	INFR	0.772	0.681	0.810
	STRR	0.875		

An item's factor loading on its respective construct should be greater than its cross-loadings on other constructs when evaluating item cross-loadings. Each item's factor loading on its respective construct was greater than its cross-loadings on any other construct, as shown in Table 5.61.

Table 5.61: Item Cross-Loadings

	Barriers	Benefit	Drivers	Potential value of effective implementation	External variables	Operational requirement
PPLB	**0.847**	0.131	0.098	0.135	0.014	-0.017
PROB	**0.847**	0.078	0.068	0.121	-0.037	-0.089
BCL	0.079	**0.877**	0.591	0.492	0.434	0.436
BCO	0.134	**0.950**	0.552	0.569	0.485	0.471
BPU	0.112	**0.905**	0.510	0.539	0.422	0.413
PROD	0.141	0.589	**0.911**	0.306	0.512	0.332
OPRD	0.003	0.447	**0.824**	0.125	0.371	0.239
COMV	0.175	0.477	0.245	**0.827**	0.121	0.427
PROV	0.146	0.473	0.264	**0.836**	0.204	0.459
STRV	0.065	0.528	0.162	**0.863**	0.207	0.497
PPLE	-0.090	0.364	0.341	0.177	**0.703**	0.224
PROE	0.023	0.461	0.499	0.239	**0.844**	0.354
TCHE	0.018	0.285	0.325	0.036	**0.769**	0.144
INFR	-0.126	0.347	0.273	0.352	0.291	**0.772**
STRR	-0.002	0.444	0.281	0.535	0.260	**0.875**

The Fornell-Larcker criterion of discriminant validity states that the square root of AVE of each construct should be greater than its correlation with another latent variable. As shown in Table 5.62, using this method revealed that the square root of the AVE of each latent variable was greater than its correlation with the other latent variables. The diagonal (bold) values are the square root of each construct's average variance extracted (AVE). (Wong, 2013).The results show that all of the diagonal (bold) values measured are significantly higher than their corresponding correlation coefficients. A discriminant validity of more than 50% is sufficient (Chin, 2010).

Table 5.62: Discriminant Validity (Fornell-Larcker criterion)

Constructs	Barriers	Benefit	Drivers	External variables	Operational requirement	Potential value of effective implementation
Barriers	**0.847**					
Benefit	0.124	**0.911**				
Drivers	0.098	0.605	**0.869**			
External variables	-0.013	0.492	0.517	**0.774**		
Operational requirement	-0.062	0.484	0.334	0.330	**0.825**	
Potential value of effective implementation	0.152	0.586	0.264	0212	0.548	**0.842**

Henseler *et al.* (2015) proposed assessing the heterotrait monotrait (HTMT) correlation ratio to examine discriminant validity. This recent method estimates the true correlation between two constructs. Henseler *et al*. (2016) proposed a threshold of 0.90. Above 0.90, there is no discriminant validity. Furthermore, the HTMT confidence interval should not include the value 1. The PLS model meets the heterotrait monotrait (HTMT) criterion, as shown in Table 5.63.

Thus, the measurement model In-terms of convergent validity and discriminant validity showed that the model is adequate in forecasting the relationships between the constructs.

Table 5.63: Discriminant Validity (HTMT Criterion)

	Barriers	Benefit	Drivers	External variables	Operational requirement	Potential value of effective implementation
Barriers						
Benefit	0.167					
Drivers	0.137	0.761				
External variable	0.102	0.614	0.726			
Operational requirement	0.160	0.687	0.544	0.524		
Potential value of effective implementation	0.223	0.693	0.304	0.281	0.818	

5.9.2 Structural model assessment

The structural model, also known as the inner model, is made up of exogenous (independent) and endogenous (dependent) constructs, as well as their relationships (Henseler *et al.,* 2016). The goal of a structural model is to show how independent and dependent constructs are linked, to determine the significance level of all paths generated by the model and to identify the variance explained by one or more constructs in the model (Chin, 2010). Independent construct values are assumed to come from somewhere other than the model. As a result, independent variables are not explained by other constructs in the model, and the structural model must contain no arrows pointing to independent constructs. The difference is that dependent constructs are explained by other constructs in the model. Each dependent construct must have one or more structural model arrows pointing to it (Henseler *et al*., 2016).

Because there are no prior constructs in the model, the external variables are the only independent constructs. Figure 5.1 depicts the structural model for effective implementation. Because PLS-SEM is based on a series of OLS regressions, all of the relationships shown in Figure 5.1 are assumed to be linear, causal, and additive (Lleras, 2005; Hair *et al*., 2012). As a result, the model described the constructs' direct and indirect links. The model had five dependent constructs, each with five sets of standardised coefficients. In this study, the set PLS-SEM hypothesised connection is as follows, as shown in Figure 5.1.

External variables (Independent constructs) = External variables + 0 (1)

Barriers = External variables + $\varepsilon 1$ (2)

Drivers = External variables + Barriers + $\varepsilon 2$ (3)

Benefit = External variables + Drivers + $\varepsilon 3$ (4)

Operational requirement = Drivers + Benefit + Barriers + ε4 (5)

Potential value of Effective implementation = Benefit + Operational requirement + ε5 (6)

Note: The symbol (ε) represents the error terms, denoting the variation that remained unexplained by the predicting variables within the path model.

The following path coefficients are represented as follows and shown in Figure 5.1.

External variables → Barriers H1

External variables → Drivers H2

External variables → Benefit H3

Barriers → Drivers H4

Drivers → Benefit H5

Benefit → Operational requirement H6

Drivers → Operational requirement H7

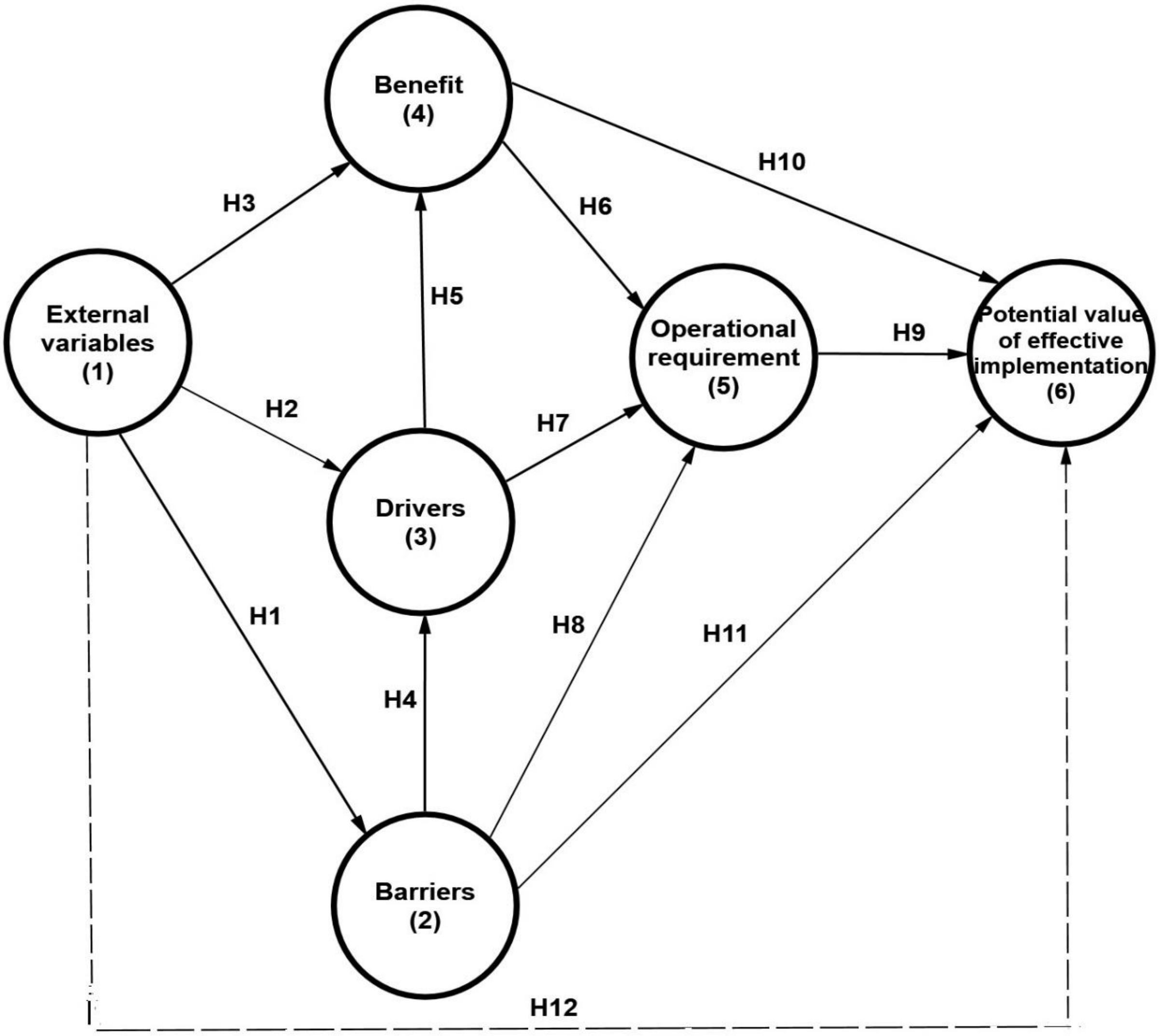
Barriers → Operational requirement H8

Operational requirement → Potential values ofEffective implementation H9

Benefit →Potential values of Effective implementation H10

Barriers → Potential values of Effective implementation H11

External variables → Barriers → Drivers → Operational requirement → Potential values of Effective implementation H12



Note: H12 is indirect connection of H1→ H4 → H7→ H9

Figure 5.1: Connection of the structural model explaining potential values of effective implementation

Firstly, collinearity issueamong items was assessed, Variance inflation factor (VIF) was used as a means to assess the collinearity issue (Petter *et al*., 2007). However, there are different recommended acceptable threshold for VIF, <10 indicates absence of collinearity. Gefen *et al* (2000) and Diamantopoulos and Siguaw (2006) recommended <3.3 as acceptable threshold. In the context of PLS-SEM a VIF value of > 5 indicates a potential multicollinearity issue, but a maximum level of 5 indicates absence of multicollinearity (Hair *et al*., 2017; Ringle *et al*., 2019). Therefore, this research adopted VIF value of <5 as it acceptable threshold. Table 5.64 shows the result of collinearity test, indicating that all items satisfied the threshold level, that collinearity is not an issue.

Table 5.64: **Collinearity Test (VIF Value)**

	Barriers	Benefit	Drivers	External variables	Operational requirement	Potential value of effective implementation
Barriers			1.000		1.016	1.036
Benefit					1.589	1.348
Drivers		1.366			1.580	
External variables	1.000	1.366	1.000			
Operational requirement						1.332
Potential value of effective implementation						

Hair *et al*. (2017) proposed using a bootstrapping procedure to test the structural model and hypotheses by looking at the R^2, beta (β), and corresponding t-values. As a result, a bootstrapping subsample of 500 was used to determine the statistical significance of the path coefficients' strength. The structural model analysis results are shown in Figures 5.2 and 5.3. The standardised path coefficients (R^2) represent the items' explanatory power on the respective constructs.Chin *et al*. (2008) categorised the dependent constructs R^2 value of a structural model should be 0.19, 0.33 or 0.69 as weak, moderate or strong respectively. Therefore, operational requirement R^2= 0.253 (25.3%) and drivers R^2= 0.279 (27.9%) are acceptable and can be described as weak results, benefit R^2= 0.410 (41.0 %) and potential values that will be derived from effective implementation R^2= 0.45 (45.0%) are both acceptable and can be described as moderate results. Whereas barriers R^2= 0.000 falls below the suggested values which explains no variation in the results. From the R^2 values, it can be suggested that the research model has a weak to moderate prediction power for the endogenous constructs while barriers which is an exogenous variable which has no predictive power.

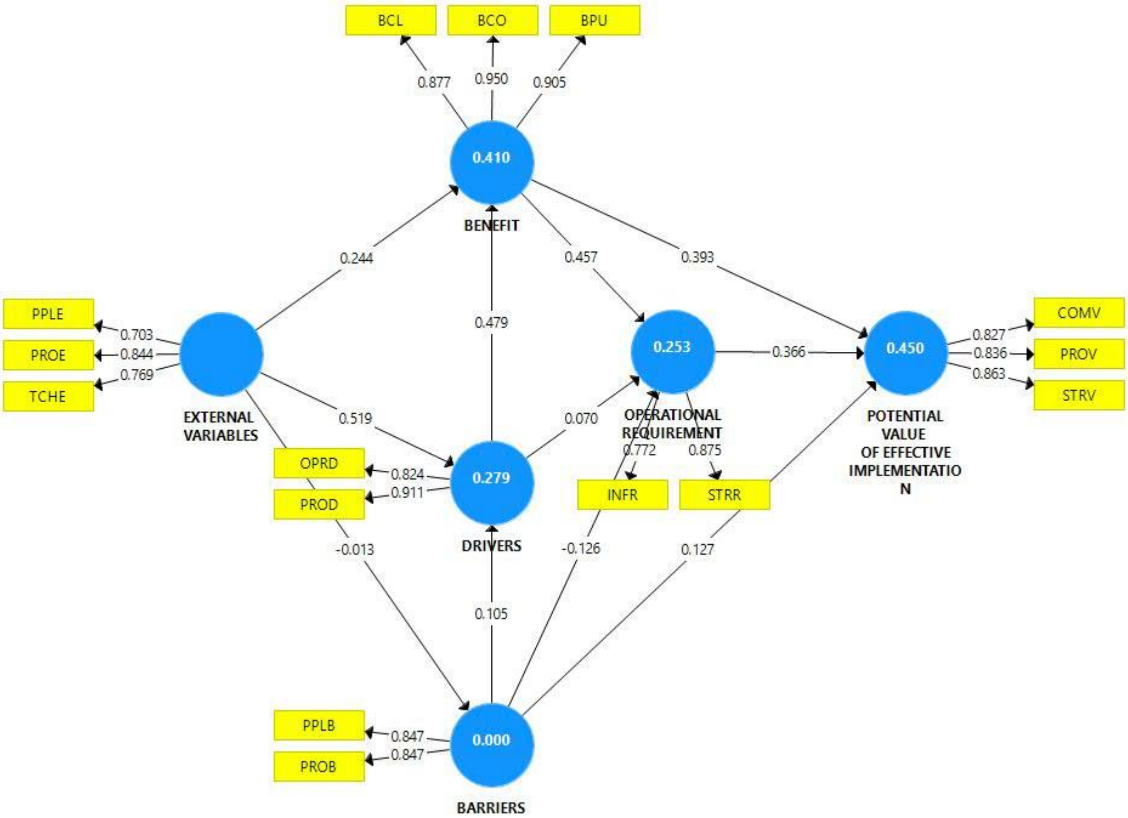


Figure 5.2: Structural Model with Path Coefficients and R-square (R^2)

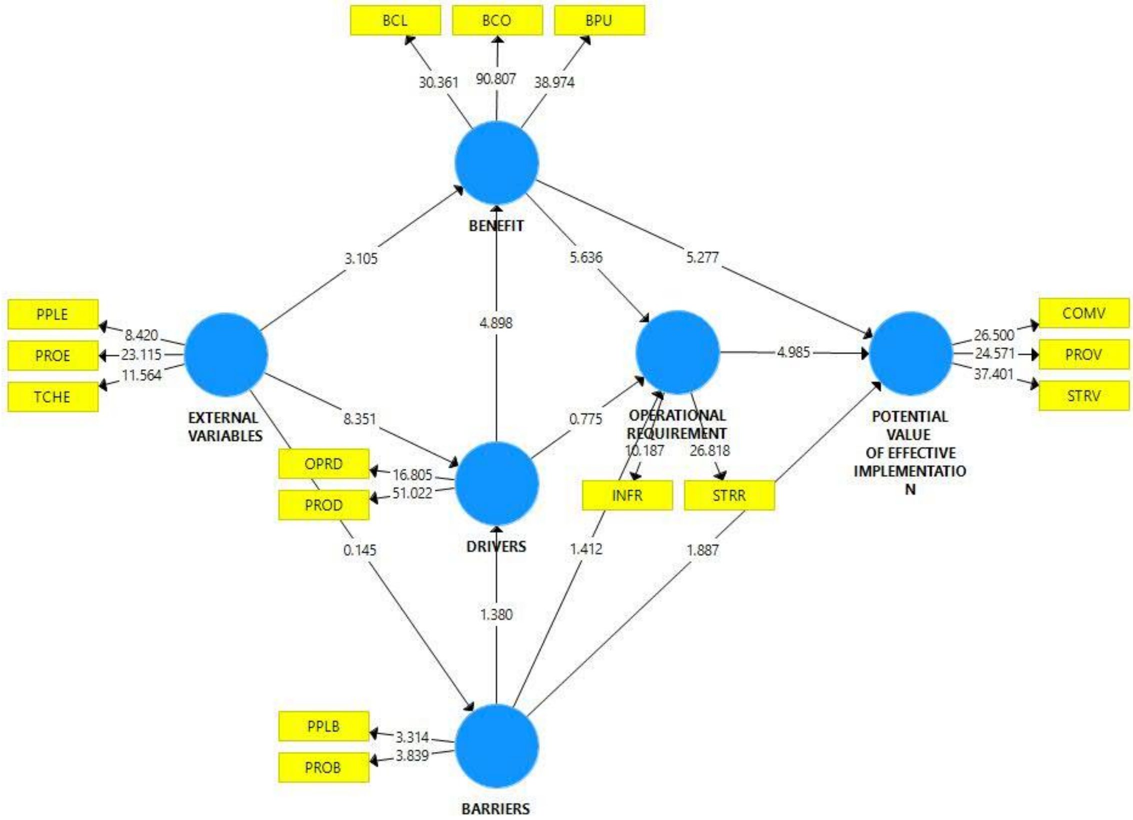


Figure 5.3: Structural Model with t-values

Structural model path coefficient and hypotheses testing is presented in Table 5.65. This was determined from the t-value. The rule of thumb in structural model is that t-value greater than 1.65, 1.96 and 2.57 are concluded to be significant at p≤0.10, p≤0.05 and p≤0.01 level respectively (Nandakumar, 2008). Therefore, eight (8) of the hypotheses/model path were strongly significant. However, only four (4) hypotheses/model path did not meet the required value of rule of thumb. Table 5.65 shows

the summary.

Table 5.65: Structural Model Path Coefficient/Hypothesis Testing

Hypothesis	Path relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
	Direct relationship						
H1	External variables → Barriers	-0.013	-0.012	0.093	0.145	0.885	Not significant
H2	External variables → Drivers	0.519	0.521	0.062	8.351	0.000	Significant
H3	External variables → Benefit	0.244	0.243	0.079	3.105	0.002	Significant
H4	Barriers → Drivers	0.105	0.109	0.076	1.380	0.168	Not significant
H5	Drivers → Benefit	0.479	0.473	0.098	4.898	0.000	Significant
H6	Benefit → Operational requirement	0.457	0.465	0.081	5.636	0.000	Significant
H7	Drivers → Operational requirement	0.070	0.067	0.090	0.775	0.439	Not significant
H8	Barriers → Operational requirement	-0.126	-0.122	0.089	1.412	0.159	Not significant
H9	Operational requirement → Potential value of effective implementation	0.366	0.366	0.073	4.985	0.000	Significant
H10	Benefit → Potential value of effective implementation	0.393	0.401	0.074	5.277	0.000	Significant
H11	Barriers → Potential value of effective implementation	0.127	0.115	0.067	1.887	0.060	Significant
	Indirect relationship						
H12	External variables → barriers →drivers →operational requirement →Potential value of effective implementation	0.288	0.291	0.046	6.217	0.000	Significant

Note:beta (β) = Original Sample (O) and t value = T Statistics (|O/STDEV|)
Source: Researcher's Analysis of Data (2020)

5.9.3 Evaluation of effect sizes

In the evaluation of effect sizes in a model, Hair *et al*. (2017) recommended that to assess the structural model, the substantive relevance significant effects should be examined by considering the predictive relevance (q^2),itwas also suggested in addition that the effect sizes (f^2) of the relationships between the constructs should be looked at. The effect size is an assessment of the magnitude of an effect that is not affected by sample size. Cohen (1988) defined q^2 and f^2 values greater than 0.020, 0.150, and 0.350 as indicating a small, medium, or large effect size, respectively.The predictive relevance of the model (q^2) was foundout and it was seen that no predictive relevance was identified for the construct “barriers” (q^2 = -0.005), while amedium predictive relevance was found for the drivers construct (q^2 = 0.195), “benefit” (q^2=0.328), operational requirement (q^2=0.152) and potential value for effective implementation” (q^2 = 0.299) respectively.

However, it is significant to note that external variables to drivers had a large effect size in the model with f^2 value of 0.374. Followed by drivers to benefit, benefit to potential value ofeffective implementation, external variables to barriers to drivers to operational requirement to potential values of effective implementation, benefit to operational requirement and operational requirement to effective implementation had a medium model effect size with f^2 value of 0.285, 0.237, 0.181, 0.176, and 0.162 respectively. Then external variables to benefit and barriers to operational requirement had small model effect size of with f^2 value of 0.074 and 0.022 respectively. While barriers to drivers, drivers to operational requirement and external variables to barriers had f^2 value of 0.015, 0.004 and 0.000 respectively indicating no effect as the value is less than the threshold of 0.020 in accordance with Cohen (1988) suggestion. Table 5.66 shows the model effect size.

Table 5.66: Model Effect Size

Hypothesis	Path relationship	T Statistics	Effect Size (f^2)	Remark
H1	External variables → Barriers	Not significant	0.000	-
H2	External variables → Drivers	Significant	0.373	Large
H3	External variables → Benefit	Significant	0.074	Small
H4	Barriers → Drivers	Not significant	0.015	-
H5	Drivers → Benefit	Significant	0.285	Medium
H6	Benefit → Operational requirement	Significant	0.176	Medium
H7	Drivers → Operational requirement	Not significant	0.004	-
H8	Barriers → Operational requirement	Not significant	0.022	Small
H9	Operational requirement → Potential value of effective implementation	Significant	0.183	Medium
H10	Benefit → Potential value of effective implementation	Significant	0.237	Medium
H11	Barriers → Potential value of effective implementation	Significant	0.208	Medium
H12	External variables → Potential value of effective implementation	significant	0.181	Medium

5.9.4 Model evaluation indices/model fit

SEM evaluation basically stands on fit indices for path coefficient and the overall model fit (Fan *et al*., 2016). Reporting fit indices in any SEM is intensely advised and required. Model fit indices were provided in approximately 93.8% of SEM publications.(Fan *et al*., 2016). However, the remaining 6.2% that did not report model fit indices did so without providing any explanation (Fan *et al*., 2016). Model performance is heavily influenced by fit indices. They are sensitive to many factors due to their different properties, such as data distributions, missing data, model sizes and sample size(Barreto, 2010). Generally, there are quite a number of fit indices applied to SEM. Hu and Bentler (1999) recommended that one should report at least two fit indices.

Hair *et al*. (2017) stated that when reporting and using model fit in PLS-SEM, caution should be exercised. SmartPLS makes them available, but believes that much more research is required to properly apply them. The model fit was tested using three model fitting parameters accessible by smartPLS 3.3.2. The first three are the Standardized Root Mean Square Residual (SRMR), the Normed Fit Index (NFI), and the exact model fit (bootstrapped based statistical inference).

Henseler *et al*. (2014) defined SRMR as a goodness of fit index for PLS-SEM that can be used to avoid model misspecification. There are recommended cut-off values for indices, but none are universally applicable (Kline 2010; Hoyle 2012). For a good model fit, the SRMR should be less than 0.09 (Hu & Bentler 1999).According to Gaskin & Lim (2016) SRMR should be considered excellent at <0.08, acceptable at >0.08 and poor at >0.10. The SRMR value for this study was 0.084. This is considered acceptable as an indication of adequate model fit according to (Gaskin & Lim 2016).

The normed fit index (NFI) is a second fit index that computes the proposed model's Chi-square value and compares it to a meaningful threshold. NFI values greater than 0.9 usually indicate a good fit. This study's NFI was 0.629 lower than the acceptable value. However, NFI is extremely sensitive to sample size (Bentler & Bonett, 1980).

According to Schuberth (2022),the value of particular model fit tests the statistical (bootstrap-based) implication of the discrepancy between the empirical covariance matrix and the composite factor model's covariance matrix. Dijkstra and Henseler (2015) proposed two methods for calculating this disparity: the dULS (squared Euclidean distance) and the dG (geodesic distance). A model fits well if the difference between the model's implied correlation matrix and the empirical correlation matrix is so small that it can be attributed solely to sampling error; thus, the difference between the model's implied correlation matrix and the empirical correlation matrix should be non-significant ($p > 0.05$).Henseler *et al*. (2016) proposed that dULS and dG be quantiled at less than 95% bootstrap (HI 95% of dULS and HI 95% of dG). The dULS was less than 95% bootstrapped (HI 95% of dULS) and dG was less than 95% bootstrapped (HI 95% of dG) in this study, indicating that the data fits the model well.

5.10 Discussion of Findings from the Model Result

PLS-SEM was used to capture all of the constructs used to test the direct and indirect relationships between the constructs.The predictive power was analysed using R^2 as shown in Figure 5.2. The model has an overall predictive value of 0.450 for effective implementation interpreted as 45.0% and this is acceptable according to Elbanna *et al.* (2013) which stated that R^2 is acceptable at 10%. All dependent constructs had acceptable R^2 values.

Also from the study, it was indicated that external variable (Technology, people and process) had a negative non-significant relationship with barrier (path= -0.013, t= 0.145, p value =0.885) with R^2 of 0.000 signifying that barrier has no predictive ability in this model.The study also showed that barriers and drivers had a positive relationship that was not significant (path= 0.105, t=1.380, p value0.168) and also the relationship between barrier and operational requirement was negative and non-significant (path-0.126, t=1.412, p value=0.159). Furthermore, all relationships with barriers were non-significant; this was thought to be so because barrier is an exogenous variable to the model and only helps to explain other variables in the model.However, the relationship between drivers of -procurement implementation and operational requirement for electronic-procurement implementation was also non-significant (path=0.070, t=0.775, p=0.439).This means that there is no relationship between drivers and operational requirements. The indirect relationship between external variables and effective implementation was also found to be significant (path= 0.288, t=6.217, p=0.000).

The results of the relationship between external variables and drivers, external variables and benefits, drivers and benefits, benefits and operational requirements, operational requirements and effective implementation, benefits to operational requirements and barriers to potential values of effective implementation of electronic-procurement were all significant. This means that there exists relationships in the links. Furthermore, the reflective indicators of potential values of effective implementation all indicated strong path coefficients and were thus statistically significant. This means that potential values that will be derived if electronic-procurement is effectively implemented was influenced by external variables, drivers, benefits and operational requirements. Since overall R^2 was 45.0% which was above the satisfactory level of 10% according to Elbanna *et al.* (2013).

Looking at the effect size of the model, it was deduced that external variables to drivers had a large effect size with F^2value of 0.373. Drivers to benefits had F^2 value of 0.285, benefits to potential values of effective implementation had F^2 value of 0.237, external variables to barriers to drivers to operational requirements to potential values of effective implementation had f^2 value of 0.181 and operational requirement topotential values of effective implementation had F^2 value of 0.183 which were all said to be having medium effect on the model. While external variables to benefit had f^2 value 0.074 and barriers to operational requirements had f^2 value of 0.022 which were said to be having small effect on the model and barriers to drivers had F^2 value of 0.015, drivers to operational requirement had a value of 0.004 and external variables to barriers had f^2 value of 0.000 these were indicated to have no effect on the model.

When the predictive relevance of the constructs in the model was looked at, it indicated that barriers was found to have no predictive relevance on the model, drivers had a small predictive relevance of q^2=0.196 while benefit had medium predictive relevance of q^2=0.328 and also potential values that will be derived with effective implementation with q^2 of 0.309. In the model fitness, the SRMR value of 0.084 was obtained and this was considered accepted meaning that the model has a good fitness. The data was also said to fit the model well because 95% H.I of both dULS and dG were obtained.

5.11 Summary of Findings

The findings of the study are presented in this section. The objectives and associated findings are being discussed.

5.11.1 Objective 1

To identify and examine the Impacts of external variables onelectronic-procurement implementation in the public sector construction.

To achieve this objective, the external variables to Electronic-procurement implementation were identified from literature and grouped into technology, people and process impacts. From the survey, non-availability of high speed internet, non-availability of reliable ICT infrastructure, expensive internet services in Nigeria and low rate of internet diffusion were technology items which were identified as having impact onelectronic-procurementimplementation. For people factor, lack of availability of skilled personnel to handle electronic-procurement tools and processes and human resource hiring development wereidentified.Political challenges, electricity supply, fear to change into a new system,non-availability of training procedure were identified as process items which has impactonelectronic-procurement implementation. This result is similar to the summarized challenges of Tran *et al.* (2011) but not grouped in the order which was identified by this study while some of the items identified are peculiar to the Nigerian public construction sector.

5.11.2 Objective 2

To identify and ascertain the drivers and potential values to the effective implementation of electronic-procurement in the Nigerian public construction sector.

Twenty three (23)items were recognised from the Delphi survey which were tested in the final survey. The survey ascertained less paper work as the most important driver item, Perceived benefits associated with reduction in the procurement cost, Reduction in time spent on procurement process, financial base of organization, Price reduction in tendering were also mentioned as having high importance and these were in corroboration with Eadie *et al.*(2007).The least considered as important from the survey are Number of existing users amongst business partners, Faster problem solving due to access to real –time information, Benefits of enhanced level of efficiency in job delivery and Geographical spread of the business activities of my organization. Drivers to electronic-procurement implementation had previously been ranked but Eadie *et al.* (2007) summarized these drivers in no particular order. These driver items were further suppressed into two components through PCA which were named process drivers and operational drivers.

For the benefits factor, items were identified from literature and grouped into benefit to clients, benefits to contractor and benefits to public. Effectiveness and efficiency, less paper work,Identifying potential sourcing opportunities,and time reduction were the most significant benefits that will be derived by clients if electronic-procurement is implemented while reduced exchange cost,Price reduction and continual usage by organizational employees were identified as the least significant.

Immediate availability of information, improved customer satisfaction,Better transparency and checking and It has an impact on service quality were items which were listed to be highly significant as benefits to contractors if electronic-procurement is implemented while Work process mechanization,Improved leverage on spending and provides wider base of buyers and suppliers were identified as least significant as benefits to contractor.

For benefits to public, Quality outcome,It has an impact on cost efficiency, customer service,user satisfaction and cost-effective technology which improves public trust were identified as the most significant benefits to public if electronic-procurement is implemented while Clear and achievable implementation phase, Clear accountability for buying in organizational structure, streamlining the ordering process to obtain significant efficiencies and Supply chain integration were identified as the least significant.

Transparency,Accountability, Time reduction and Fast and efficient procurement process were the most significant potential values that can be derived from effective implementation of electronic-procurement while Price reduction,Faster arrival of products from the supplier and strengthening the trading relationship between different partners were the least important items.The potential values were further suppressed into three components namely: process values, compliance values and strategic values.

5.11.3 Objective3

To examine the barriers to the implementation of electronic-procurement in the public sector construction projects in Nigeria.

To ascertain the barriers, fifteen barrier items were rated; Resistance to new technology,enforceability of electronic contracts, resistance to change and lack of top management support and commitment were ascertained as most significant items posing as barriers to electronic-procurement implementation while lack of laws on electronic-procurement,lack of flexibility and investment in electronic devices were ascertained to be least significant. Barriers to implementation of electronic-procurement had been ranked by previous works in different countries. Hawking *et al.*(2004) ranked them from the Australian perspective, Minahan and Degan (2001) from the American perspective while Eadie *at al.* (2007) summarized the barriers. In the summarised barriers, some of the ascertained barriers in this study, fall amongst them while some are peculiar to the Nigerian environment. Ranking these barriers from the Nigerian perspective, Resistance to new technology is the highest barrier in the public construction sector of the country. These barrier items were further suppressed into three components which were renamed: institutional barriers, process barriers and people barriers.

5.11.4 Objective 4

To establish the operational requirement for electronic-procurement implementation in the public construction sector.

Availability of high speed internet,Management commitment on implementation of electronic-procurement, Technological availability and Good knowledge of electronic-procurement were established as the most significant operational requirement items for electronic-procurement implementation in the public construction sector. The least significant items were Provision of Security, privacy and trust concerns, High rate of internet diffusion and Supplier identification.. These factors were further supressed by PCA into three components which were renamed infrastructural requirements, technological requirements and strategic requirements.

5.11.5 Objective 5

To develop and validate a model for Electronic-procurement implementation in the public construction sector.

Several studies have developed models for electronic-procurement implementation in the construction sectors of different nations; Gunasekaran and Ngai (2008) established a model for electronic-procurement adoption in Hong Kong, Tran and Huang (2014) developed a model for electronic-procurement Institutionalization in Construction Industry in Developing Countries with a focus on Hanoi in Vietnam, Tran *et al.* (2011) developed system engineering assessment model for a construction enterprise's readiness level in implementing e- procurement. This study set out to develop a model for electronic-procurement implementation in the public Nigerian construction sector. To achieve this, a conceptual framework was developed from literature in which the constructs were tested for statistical significance relations of the twelvepath relationships tested had statistical significance while four did not have statistical significance. For this model, in determining its fitness, the SRMR was 0.084 which was considered accepted as an indication of adequate model fit. The exact model fit was also determined and the dULS was < 95% bootstrapped (HI 95% of dULS) and dG was < 95% bootstrapped (HI 95% of dG) signifying that the data fits the model well. From all above it could be said that the model is capable of predicting effective implementation of electronic-procurement in the Nigerian public construction sector.The model is thus shown in Figure 5.1

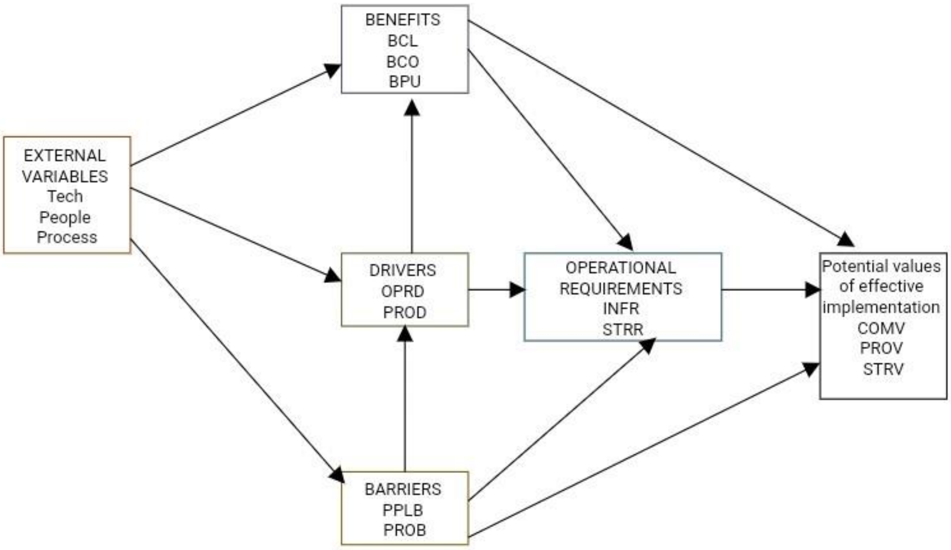


Figure 5.4 Developed model for the study.

Key:Tech = Technology, BCL= benefits to clients, BCO = benefits to contractors, BPU = benefits to Public, OPRD = operational drivers, PROD = process drivers, PPLB = people barriers, PROB = process barriers, INFR = infrastructural requirement, STRR = strategic requirements, COMV = compliance value, PROV = process values, STRV = strategic values.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The conceptual model was validated through findings derived from PLS-SEM conducted using SmartPLS 3.3.2. The analysis of the SEM established that there was no positive statistical significant relationship between external variables and barriers, barriers and drivers, drivers and operational requirements, barriers and operational requirements. The SEM analysis also revealed that positive statistical significant relationship exists between external variables and drivers, external variables and benefits, drivers and benefits, drivers and operational requirements, operational requirements and effective implementation, benefits and effective implementation and finally,revealed that the indirect relationship between external variables and effective implementation was also significant.

Based on these, the constructs that determine effective implementation of electronic-procurement are: external variables (Technology, people and process), Drivers, benefits, operational requirements all these showed positive significant effects on effective implementation of electronic-procurement. The public sector construction in Nigeria can therefore adopt the developed model to ensure effective implementation of electronic-procurement.

6.2 Recommendations

The following recommendations were drawn from the conclusions of the study so as to ensure effective implementation of electronic-procurement in the public construction sector in Nigeria.

i. Government should ensure the availability of high speed internet and less expensive internet services, reliable ICT Infrastructure and increased rate of internet diffusion are made readily available in its Ministries and MDAs to ensure effective implementation of electronic-procurement in the public construction sector.
ii. The Government should provide training for skilled personnel to use electronic-procurement tools and processes, as well as human resource hiring development, to ensure that the right people are hired.
iii. Government should provide rules so that there would be no effect of Political challenges on effective implementation of electronic-procurement in the public construction sector.
iv. Electricity supply and availability of training procedure should be made readily available in Ministries and MDAs to ensure effective implementation of electronic-procurement in the public construction sector.
v. Professionals in the MDAs should be kept more abreast of numerous benefits of electronic-procurement implementation through trainings so as to enable them accept new technologies, accept change, top management should be able to give its support and commitments so that electronic contracts could be enforced.
vi. Government should test run the developed and validated model and it should be adopted for use in Ministries and MDAs since the model was said to be fit and valid at predicting effective implementation of electronic-procurement in the public construction sector.
vii. By amending the relevant sections of the Public Procurement Act of 2007, the Federal Government should include the Nigerian Institute of Quantity Surveyors

(NIQS) in the National Council on Public Procurement (NCPP) for effective procurement in public sector construction projects.

6.3 Contribution to Knowledge

The research established the challenges, drivers, barriers, benefits, operational requirements which are peculiar to public construction sector in Nigeria and also the potential values which will be achieved with effective implementation of electronic-procurement in the public construction sector in Nigeria. The research has also identified the constructs where much efforts need to be put into to achieve effective implementation of electronic-procurement in the public construction sector in Nigeria.The developed model adds significantly to the body of knowledge on electronic-procurement in the public construction sector. The research has also established that effective implementation of electronic-procurement gives accountability, transparency, improves speed of service, user satisfaction among other things, it was also established by the research that barriers to implementation of electronic-procurement is exogenous and does not have any effect on the model but only helps in explaining other constructs in the model. The study also made a significant contribution by developing a structural model for the implementation of electronic-procurement in public sector construction projects in Abuja. The model was validated in part by hypotheses testing and in whole by PLS-SEM, which tested the relationship with other constructs included in the model.As a result, this study has added to the body of knowledge by developing and validating a model for Electronic-procurement implementation in Nigeria's public construction sector. This model will be very useful in the effective implementation of electronic-procurement by the Nigerian Government.

This research becomes very useful in determining means of achieving effective implementation of electronic-procurement in the public sector.

6.4 Area for Further Studies

Further studies can also be carried out using other research methodologies such as interviews to get a variant view from what is obtainable in this study.

REFERENCES.

Aboelmaged, M.G. (2010). Predicting electronic-procurement adoption in a developing country An empirical integration of technology acceptance model and theory of planned behaviour, *Industrial Management & Data Systems*,11(3-4), 392-414.

Aboki, L. Y. (2006). *Monitoring And Evaluation For Accountability: The Case of Nigeria'S Virtual Poverty Fund.* http://www.ucl.ac.uk/~uctpdro/files/Paper_OPEN_M&E.pdf. Assessed on 18th January, 2018.

Abubakar, A.H., Yusof, M.N., Awang, A., & Adamy, A. (2014). Survival strategies of construction companies in Malaysia during two periods of recession. *International Journal of Academic Research*, 4, 481–486.

Adebayo, V.O. & Evans, R.D., (2015). Adoption of Electronic-procurement systems in developing countries: A Nigerian public sector perspective. In 2015 *2nd International Conference on Knowledge-Based Engineering and Innovation (IEEE).* November 5, Tehran, Iran, 20-25.

Adebiyi, A. A., Ayo, C. K. & Adebiyi M. O (2010). Development of Electronic Government Procurement (e-GP) System for Nigeria Public Sector.*International Journal of Electrical & Computer Sciences,* 10 (6), 69-76.

Adejimi, A., Oyediran, O.S. & Ogunsanmi, E. B. (2010). Employing Qualitatively Enriched Semi Structured Questionnaire in Evaluating ICT impact on Nigerian Construction Chain Integration .*The built and Human Environment Review*, 3 (1), 49-62.

Adewole, A. (2014). Governance Reform and the Challenge of Implementing Public Procurement Law Regime across Nigerian State and Local Governments. *International Journal of Public Administration and Management Research (IJPAMR),* 2(4), 25–32.

Adeyeye, A. (2015). Governance reform and public procurement law regime in Nigerian federating states: a case study of Oyo state. *International journal of development and economic sustainability,* 3(1), 18-29.

Adil, M., Nunes, M. B. & Peng, G. C (2014). Identifying operational requirements to selectsuitable decision models for a public sector electronic-procurement decision support system. *Journal of information systems and technology management*, 11, 211-228.

Adnan, H. & Mortledge, R. (2003) Application of Delphi method on critical success factors in joint venture projects in the Malaysian construction industry, *Paper presented at the CITC-II Conference, Hong Kong*, 10–12 December.

Adusei, C. & Awunyo-Vitor, D. (2015). Implementation challenges of the public procurement act by selected metropolitan, municipal and district assemblies in the Ashanti Region, Ghana. *iBusiness,* 7(01), 39-50.

Aduwo, E. B, Ibem, E.O, Uwakonye, O, Tunji-Olayeni, P &Ayo-Vuaghan, E.K (2016). Barriers to the uptake of electronic-procurement in the Nigerian building industry. *Journal of Theoretical and Applied Information Technology,* 89(1), 133-147.

Afolabi, A., Ibem, E., Aduwo, E., Tunji-Olayeni, P. & Oluwunmi, O. (2019). Critical Success Factors (CSFs) for electronic-procurement Adoption in the Nigerian Construction Industry. *Buildings,* 9(2), 47. Https//doi.org/10.3390/buildings9020047.Www.mdpi.Com/journal/buildings.

Agarwal, R., Chandrasekaran, S. & Sridhar, M (2016). Imagining construction's digital future. Capital project and infrastructure, McKinsey and Company. https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our insights/imagining-constructions-digital-future.

Aghimien, D.O (2020). *A Digitalisation Capability Maturity Model for Construction Organisations in South Africa*. An Unpublished PhD thesis submitted to the Faculty of Engineering and the Built Environment, University Of Johannesburg, Johannesburg, South Africa.

Agumba, J.N. (2013). *A Construction Health and Safety Performance Model for South African Small and Medium enterprises*. An unpublished doctoral dissertation: University of Johannesburg.

Aigbavboa C. (2013). *An integrated beneficiary centred satisfaction model for publicly funded housing schemes in South Africa*. A PhD Thesis submitted to the Post Graduate School of Engineering Management, Johannesburg: University of Johannesburg.

Ajayi, S. (2017). *Design, Procurement and Construction Strategies for minimizing waste in Construction Projects*. An unpublished PhD thesis submitted to the University of the West England.

Ajibike, K.O. (2019). Report on Electronic-procurement in the Federal Capital Territory. Electronic-procurement file FCTA/TB. http://www.uwc.ac.za/Students/Postgr aduate/Documents/Research and Design.1.pdf.

Ajzen, I & Fishbein, M (1980). *Understanding attitudes and predicting social behaviour*: fs, NJ: Practice Hall.

Akaba, T.I. (2020). *A framework for the adoption of a blockchain- based electronic-procurement system: a case study of Nigeria*. An unpublished Master's thesis submitted to School of Information Technologies, Tallinn University of Technology.

Akindoyeni, A. (2005). Nigerian building craftsmen: which way forward? *Paper presented at the NIOB craftsmen summit, 7th July. 2005,* Yaba college of Technology, Lagos.

Akintola, A.A & Oyediran, O.S. (2011). A Survey of the state of the art of e-tendering in Nigeria. *Journal of Information Technology and Construction,* 16, 557–576.

Akintoye, A. (2015). Developing theoretical and conceptual frameworks presentation outlines. Https:// jedm.oauife.edu.ng>uploads.

Alabi, A. A. (2012). Comparative Study of Environmental Sustainability in Building Construction in Nigeria and Malaysia. *Journal of Emerging Trends in Economics and Management Sciences,* 3(6), 951-961

Alam, S. S., & Noor, M. K. M. (2009). ICT adoption in small and medium enterprises: An empirical evidence of service sectors in Malaysia. *International Journal of Business and Management*, 4(2), 112.

Alfaadhel, S. (2010). *An empirical study of critical success factors for small and medium enterprises in Saudi Arabia: Challenges and Opportunities*. An Unpublished Doctoral dissertation submitted to the University of Bradford.

Alhazmi, T., & McCaffer, R. (2000). 'Project Procurement System Selection Model. *Journal of Construction Engineering and Management* 126 (3), 176-184.

Ali H.A., Ola L.B, Bjorn A.C., Olav T.D., Nil O.E. & Jarder L.F., (2016). Selection Criteria for Delivery Methods for Infrastructure Projects. *Procedia-Social and Behavioral Sciences,*226, 260-268

Ali, F., Rasoolimanesh, S.M., Sartedt, M., Ringle, C. & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, 30(1), 514-538.

Ali, H. (2014). *Importance & Adoption of electronic-procurement and Supply Chain Management Integration: Public Sector Perspective in Pakistan.* An unpublished MBA thesis submitted to Department of Management Sciences (MS) Bahria Institute of Management and Computer Sciences Bahria University Islamabad.

Altayyar, A. (2017). *Investigating Electronic-procurement Barriers within Six Saudi Arabian SMEs*. An unpublished PhD thesis submitted to the University of Bedfordshire.

Amaratunga, D., Baldry, D., Sarshar, M. & Newton, R. (2002). Quantitative and qualitative research in the built environment: application of mixed research approach*. Work Study,* 51(1), 17-31.

Ameh, O.J. & Ogundare, O. (2013) Impact of due process policy on construction projects delivery in Nigeria. *Journal of building performance, the royal institution of surveyors Malaysia*, 4(1), 13-23.

Ameyaw, E.E., Hu, Y., Shan, M., Chan, A.P.C. & Le, Y. (2016). Application of Delphi method in construction engineering and management research: A quantitative perspective. *Journal of Civil Engineering and Management,* 22(8), 991-1000

Anderson. J. D. (2006). Qualitative and Quantitative research. Grants and Evaluation Office; Imperial COE. Obtainable at https:// www./coe.org/webm_send/1936. Accessed on 18th April, 2018.

Andranovich, G. (1995). *Developing community participation and consensus: The Delphi Technique.* Pullman.

Anumba, C.J. & Ruikar, K.(2002). E-commerce in construction – trends and prospects. *Automation in Construction,* 11(3), 265-275.

Aranda-Mena, G. (2004). E-Business adoption in construction: *international review on impediments.* CRC for construction innovation, Brisbane

Asare, E. N. & Prempeh, K. B. (2017). An empirical assessment of factors that influence the implementation of electronic-procurement in technical universities in Ghana. *Journal of logistics management*, 6(2), 52-60.

Attah M.B (2009). Public Procurement Act: A potent weapon against corruption? Https://www.ngrguardiannews.com/moneywatch/article02//indexn3_html?pdate=300909&ptitle=Public%20Procurement%20Act:%20A%20potent%20weapon%20against%20corruption.

Attaran, M. (2001). The coming age of online procurement. *Industrial Management & Data Systems*, 101 (4), 177-181.

Ayangade, J.A., Wahab, A. B. & Alake, O. (2009). An introduction of due process mechanism in the execution of construction projects in Nigeria .*Civil Engineering dimension*, 11(1)1-7.

Ayodele E. O & Alabi O. M. (2011). Abandonment of Construction Projects in Nigeria: Causes and Effects. *Journal of Emerging Trends in Economics and Management Sciences*, 2 (2), 142-145.

Azmi, K. & Rahman, A. (2015). Electronic-procurement: a tool to mitigate public procurement fraud in Malaysia. *The electronic journal of e-Government*, 13(2*)*.361-368.

Babatunde, S.O., Opawole, A. & Ujaddughe, I.C. (2010). An Appraisal of Project Procurement Methods in the Nigerian Construction Industry. *Civil Engineering Dimension*, 12 (1), 1-7.

Bacharach, S. B. (1989). Organisational Theories: some criteria for evaluation. *Academy of management review*, 14(4), 496-515.

Bahreman, B. (2014,). Electronic-procurement in Iran cement industry limitations and benefits. In Information Technology: New Generations (ITNG), 2014 *11th International Conference*, 581-586. IEEE.

Banwo, O. (2016). *The Development of a Procurement Decision Support System to Enhance Construction Claims Management Practice*. Unpublished PhD Thesis submitted to the faculty of engineering, environment and computing school of energy, construction and environment Coventry University.

Barratt, M. & Rosdahl, K. (2002). Exploring business- to- business market sites. *European journal of purchasing and supply management*, 8(2), 111-122.

Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of Management*, 36(1), 256-280.

Basheka, B.C (2009). 'Procurement planning and local governance in Uganda: a factor analysis approach', *International Journal of Procurement Management*, 2(2), 191-209.

Baskerville, R. & Pries-Heje, J. (2001). A multiple-theory analysis of a diffusion of information technology case. *Information Systems Journal*, 11(3), 181-212.

Basri, S. B. & Dominic, P. D. D. (2010). Electronic-procurement current and future readiness level in Malaysia. *2010 IEEE conference on open systems*, 12-16.

Bedard-Maltais, P. (2017). Industry 4.0: The New Industrial Revolution - Are Canadian manufacturers ready? BDC Study. Https://www.bdc.ca/EN/Documents/analysis.../bdc-resume-etude-manufacturing-en.

Bedell, D. (2002). Solving the Headaches of e Procurement. *Corporate Finance*, 210, 24-27.

Belanche, D., Casaló, L. V., &Flavián, C. (2012). Integrating trust and personal values into the Technology Acceptance Model: The case of e-government services adoption. *Cuadernos de Economía y Dirección de la Empresa*, 15(4), 192-204.

Bello, W.A., & Iyagba, R.O.(2013). Comparative Analysis of Barriers to E procurement among Quantity Surveyors in UK and Nigeria. *Scottish Journal of Arts, Social Sciences and Scientific Studies*, 14(2), 175-187

Bendoly, E. & Schoenherr, T. (2005). ERP system and implementation process benefits: implications for B2B Electronic-procurement. *International Journal of Operations & Production Management*, 25 (4), 304–319.

Bentler, P. M., & Bonett, D. G. (1980). Significance Tests and Goodness-of-Fit in the Analysis of Covariance Structures. *Psychological Bulletin*, 88, 588-600.

Berger, R. (2016). Digitization in the construction industry. *Think Act*, 1-16

Bergman, M. M. (Ed.). (2008). *Advances in mixed methods research: Theories and applications*. Sage.

Bernard, H. R. (2002). *Research Methods in Anthropology: Qualitative and Quantitative methods*. 3rd edition. AltaMira press.

Betts, M, Black, P, Christensen, SA, Dawson, E, Du, R, Duncan, W, Foo, E & Nieto, G (2010). Towards secure and legal e-tendering. *Journal of Information Technology in Construction*, 11, 89-102.

Bharat, B. & Abhijit, B. (2010). Measuring Determinants of E-Commerce Readiness and their Effects on Buying Intention for Online Purchase Decisions. *Advances in Management*, 3(7). Https//ideas.repec.org.

Bharati, P. & Chaudhury, A. (2006). Studying the current status of technology adoption. *Communications of the ACM*, 49(10), 88-93.

Bhaskaran, S. (2013). Structured case studies: Information communication technology adoption by small-to-medium food enterprises. *British Food Journal*, 115, 425–447

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* 2nd*Edition*. Tampa, Florida, USA: Published under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

Bhattarai, P. (2011). Curbing procurement corruption, Voices against corruption,<http://voices-against-corruption.ning.com/profiles/blogs/curbing-procurement-corruption>.

Blaxter, L., Hughes, C. & Tight, M. (2006). *How to research.* 3rd Edition.Open University press.

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. Frontiers in Public Health. https://doi.org/10.3389/fpubh.2018.00149.

Boer, L., Harink, J. & G. Heijboer, G. (2001). A model for assessing the impact of electronic procurement forms, in *10th Int. Annual IPSERA Conference*, 2001, 119–130.

Bolton, P. (2006). Government procurement as a policy tool in South Africa. *Journal of Public Procurement,* 6(3), 193-217.

Borges, M., Hoppen, N., & Luce, F. B. (2009). Information technology impact on market orientation in e-business. *Journal of Business Research,* 62, 883–890.

Bourne, L. (2005). Visualizing and mapping stakeholder influence. *Management Decision,* 43(5), 649-660. Https//doi.org/10.1108/00251754051059 7680.

Braeken, J. & Van Assen, M.A.L.M. (2016). An empirical Kaiser criterion. *Psychological methods,* 22(3), 1-17. DOi: 10.1037/met0000074.

Brewer, E., Demmer, M., Du, B., Ho, M., Kam, M. &Neydevschi, S. (2005). The case for technology in developing regions. *Computer,* 38 (6), 25- 38.

Bryman, A. & Bell, E. (2007). *Business Research Methods.* Oxford University press.

Budget monitoring and price intelligent unit (2005). A mechanism for combating corruption in infrastructure delivery in Nigeria. Obtainable at https://assets. publishing.service. gov.uk.

Bughin, J. & Zeebroeck, N. (2017). The best response to digital disruption. *MIT Sloan Management Review*, 58, 80-86

Bureau of Management (2005).*Procurement Manual,*Office of Legal and Procurement Support.

Bureau of Public Procurement (2008). Procurement Procedure Manual for Public Procurementin Nigeria, http://www.nigeriafirst.org/docs/bpp/Procurement_Manual.pdf.

Bureau of public procurement (BPP) (2016). Procurement specialist solutions and innovations in public procurement, the World Bank. http://wbnf. Procurement .org.

Burton, R. (2005). Improving Integrity in public procurement: The role of transparency and accountability, in Fighting Corruption and Promoting Integrity in Public Procurement, *OECD Publishing,* 8, 23.

Business Anti-corruption portal. Https://www.business-anti-corruption.com/

Cabanis, K. (2001). Counselling and computer Technology in the new millennium: An internet Delphi Study. Http:// scholar.lib,vt.edu/theses/available/etd-03072001.175713.

Castagnino, S., Rothballer, C. & Gerbert, P. (2016). What's the future of the construction industry? World Economic Forum. https://www.weforum.org/agenda/2016/04/building-in-the-fourth-industrial-revolution/.

Castro,F. G., Kellison, J.G.,Boyd, S. J. & Kopak, A. (2010). A methodology for conductiong integrative mixed methods research and data analyses. *Journal of mixed methods research,* 4(4), 342-360.

Chaffey, D. (2002). *E- Business and E-Commerce Management*. Prentice Hall.

Chan, A.P.C., Yung, E.H.K., Lam. P.T.I., Tam, C.M. & Cheung, S.O. (2001). Application of Delphi method in selection of procurement systems for construction projects. *Construction Management and Economics*, 19,699-718.

Chandran, C. (2004). *Research Methods: A Quantitative approach with Illustrations from Christian Ministries*. Daystar University Nairobi, Kenya.

Chang, H., & Wong, K. (2010). Adoption of electronic-procurement and participation of e-marketplace on firm performance: Trust as a moderator. *Information & Management,* 47(5), 262-270.

Chew, D.A.S., Yan, S. & Cheah, C.Y.J. (2008). Core capability and competitive strategy for construction SMEs in China. *Chinese Management Studies,* 2(3), 203-214.

Chilipunde, R. L. (2010). *Constraints and Challenges Faced By Small, Medium and Micro Enterprise Contractors In Malawi.* A thesis submitted to the Faculty of Engineering, the Built Environment and Information Technology, Nelson Mandela Metropolitan University, School of the Built Environment

Chin, W.W., Marcolin, B., L. & Newsted, P.R. (1996). A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects- Results from a Monte Carlo Simulation Study and Voice Mail Emotion/Adoption Study. *International Conference on Information Systems (ICIS) Proceedings,* 21-41. Available on: http://aisel.aisnet.org/icis1996/6

Chin, W. W., Peterson, R. A., & Brown, P. S. (2008). Structural equation modelling in marketing: Some practical reminders. *Journal of Marketing Theory and Practice*, 16(4), 287-98.

Chin, W.W., (2010). How to Write Up and Report PLS Analyses. In: Esposito Vinzi, V., Chin,W.W., Henseler, J., Wang, H. (Eds.), *Handbook of partial least squares. Concepts, methods and applications.* Heidelberg.

Chitkara, K. (2004). *Construction Project Management, Planning, Scheduling and Controlling.* Tata McGraw Hill, 4th Edition.

Christenses, S & Duncan, W. (2006). Maintaining the integrity of electronic tendering by government-reflections on the capacity of the Australian legal framework to meet this challenge, *Electronic Law journal,* 13(2), 8-36.

Christopher, M. & Gattorna, J. (2005). Supply chain cost management and value-based pricing. *Industrial marketing management,* 34(2), 115-121.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences (*2nd Ed.). Lawrence Earlbaum Associates.

Construction Industry Development Board (CIDB) (2017). *Construction Monitor; Employment*, (10), 1-20

Collins, H. (2010). *Creative Research: the theory and practice of research for the creative industries*. AWA publishing.

Collis, J. & Hussey, R. (2003). *Business research methods: A practical guide for undergraduates and postgraduates*. Palgrave Macmillan.

Country Procurement Assessment Report (CPAR) (1999). *Nigeria Country Procurement Assessment Report (CPAR).*www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2001/06/08/000094946010530040050 48/Rendered/PDF/multi0page.pdf.

Cox, A.(2001). Understanding buyer and supplier power: a framework for procurement and supply competence. *Journal of Supply Chain Management*, 37(1),8-15.

Creswell, J. W. & Miller, D. L. (2000). Determining Validity in Qualitative Inquiry. *Theory into Practice*, 39(3), 124-130.

Creswell, J. W. (2003) *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* (2ed.). Sage

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.*3rd ed. SAGE Publications. Inc.

Creswell, J. W., Trout, S., & Barbuto, J.E.J. (1996). *A Decade of Mixed Methods Writing: A Retrospective.*<http://www.aom.pace.edu/rmd/2002forum.html>

Crisp, J., Pelletier, D., Duffield, C., Adams, A., &Nagy, S. (1997). The Delphi method? *Nursing research*, 46 (11), 6-8

Croom, S. & Johnston, R. (2005). E-service: Enhancing internal customer service through electronic-procurement. *International Journal of Service and Industrial Management*, 14, 539–555.

Croom, S & Brandon-Jones, A. (2007). Impact of electronic-procurement: Experiences from implementation in the UK public sector. *Journal of Purchasing and Supply Management*, 13, (4), 294-303.

Cuhls, K., (2003). Delphi method. http://www.unido.org/fileadmin/import/16959_DelphiMethod.pdf.

Dai, Q. & Kauffman, R. J. (2001). Business models for internet based electronic procurement systems and B2B electronic markets: *an exploratory assessment. Hawaii international conference on system science held in January at MAUI, Hawaii.*

Daud, N.M., Mohammad, N., Azmi, A.E. & Mohamed, I.S. (2013). Factors influencing the usage of electronic-procurement among contractor companies in Malaysia. *Business Management Quarterly Revised*, 4, 62–80.

David, R. (2005). The future of managing electronic records. *Records management journal*, 15 (3), 128-130.

Davila, A., Gupta, M. & Palmer, R. (2003). Moving Procurement Systems to the Internet: The Adoption and Use of Electronic-procurement Technology Models.*European Management Journal*, 21(1), 11-23.

Davis Jr, F.D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results.* An unpublished Doctoral dissertation submitted to Massachusetts Institute of Technology.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-339.

Davis, P., Love, P & Baccarini, D. (2008). *Building Procurement Methods*, Melbourne: Curtin University of Technology Western Australia Department of Housing & work Royal Melbourne Institute of Technology.

Denscombe, M., (2008). Communities of practice: a research paradigm for the mixed methods approach. *Journal of Mixed Methods Research,* 2(3), 270-283.

Diamantopoulous, A. & Siguaw, J. A. (2006). Formative versus Reflective indicators in Organisational measure Development: A comparison and Empirical Illustration. *British journal of management,* 17(4), 263-282.

Dijkstra, T.K. & Henseler, J. (2015). Consistent partial least squares path modelling. *MIS Quarterly*, 39(2), 297-316.

Dimick, S. (2014), Adopting Digital Technologies: The Path for SMEs. Ottawa: *The Conference Board of Canada*, 1-13

Doherty, N.F., McConnell, D. & Ellis- Chadwick, E. (2013). Institutional Responses to Electronic Procurement in the Public Sector. *International Journal of Public SectorManagement*, 26(6), 495-515.

Dooley, K. & Purchase, S. (2006). Factors influencing electronic-procurement usage. *Journal of public procurement, Boca Raton,* 6(1-2), 28-40

Doyle, T. (2010). Information and communications technology procurement for border management. *Border Management Modernization, Washington DC USA,* 147.

Du Plooy, N. F. (1998). *An analysis of the human environment for the adoption and use of information technology*. D.Com. thesis, University of Pretoria.

Duan, Y., He, Q., Feng, W., Li, D., & Fu, Z. (2010). A study on e-learning take-up intention from an innovation adoption perspective: A case in China. *Computers & Education,* 55(1), 237-246.

Duncombe, R. & Heeks, R. (2002). Enterprise across the digital divide: information systems and rural microenterprise in Botswana. *Journal of International Development*, 14(1), 61-74.

Eadie, R., Perera, S. & Heaney, G. (2010). A cross-discipline comparison of rankings for e- procurement drivers and barriers within UK Construction Organizations, *Journal of Information Technology in Construction*, 15, 217-23

Eadie, R., Perera, S., Heaney, G. & Carlisle, J. (2007). Drivers and Barriers to Public Sector electronic-procurement within Northern Ireland's Construction Industry, *ITcon Journal*, 12, 103-120.

Eadie, R., Perera, S.& Heaney, G. (2011). Analysis of the use of Electronic-procurement in the public and private sectors of the UK construction Industry. *Journal of information technology in construction*, 16, 669-686

Eastman, C., Teicholz, P., Sacks, R. & Liston, K. (2011). *BIM Handbook – A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors.* 2nd Edition. Wiley.

Eei, K.S., Husain, W. & Mustaffa, N. (2012). Survey on benefits and barriers of electronic-procurement: Malaysian SMEs perspective. *International Journal on Advanced Science, Engineering and Information Technology*, 2(6), 424-429.

Eidhoff, A.T., Stief, S. E., Voeth, M. & Gundlach, S. (2016). Drivers of digital product innovation in firms: An empirical study of Technological, Organizational and environmental factors. *International journal of economics and management engineering*, 10(6), 1888-1892.

Eke, C.C. (2017). *An integrated quality construction management model for low-income housing in South Africa.* An unpublished PhD thesis submitted to the faculty of engineering and the built EnvironmentUniversity of Johannesburg, Johannesburg, South Africa.

Ekwekwuo, C. C. (2016). A case study of the Nigerian procurement monitoring program and its portal and observatory. Wyith Limited and Wyith Institute, 1–5. http://www.commentary.com/procurement_monitoring.htm.

Elbanna, S., Child, J., & Dayan, M. (2013). A Model of Antecedents and Consequences of Intuition in Strategic Decision-making*:* Evidence from Egypt. *Long Range Planning*, 46, 149-176.

Emuze, F. A & Smallwood, J. (2011). Improving Project Delivery in South African Construction: Engineers' perspectives. *Proceedings 6 Built Environment Conference*, Held at University of Johannesburg, South Africa, 31 July -2 August 2011.

Eng, T.Y. (2004). The role of e-marketplaces in supply chain management. *Industrial marketing management*, 33(2), 97-105.

Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics,* 5(1), 1-4.

European Commission (2012).EU public procurement legislation: delivering results Summary of evaluation report. Brussels: EU

Evenett, J.S. & Hoekman, B.M., (2005). Government procurement: market access, transparency and multilateral trade rules. *European Journal of Political Economy,* 21(1),163-183.

Eze, N. M. (2015). Due process in the procurement system: the Nigeria experience. *International Journal of Engineering Sciences & Research Technology*, 9655(7), 234–243.

Fadhil, M. D., and Tan, F. H. (2001). Developing World Class Construction Companies in Singapore. *Construction Management and Economics*, 19(6), 591-599.

Familoye, O., Ogunsemi, D. R., & Awodele, O. A. (2015). Assessment of the Challenges Facing the Effective Operations ofthe Nigeria Public Procurement Act 2007. *International Journal of Economics, Commerce, and Management*, 3(11), 957–968.

Fan, Y., Chen, J., Shirkey, G., John, R., Wu, S. R., Park, H., & Shao, C. (2016). Applications of structural equation modeling (SEM) in ecological studies: An updated review. *Ecological Processes*, *5*(1), 19. Https://doi.org/10.1186/s13717-016-0063-3.

Farzin, S. & Nezhad, H. (2010). Electronic-procurement, the Golden Key to Optimizing the Supply Chains System. *World Academy of Science, Engineering and Technology, InternationalScience Index* 42, 4(6), 449 – 456.

Fatrachian, H. & Kazemi, H. (2021). Impact of Industry 4.0 on supply chain performance. *Production planning and control*, 32(1), 63-81.

Fayomi, I. O. (2013). Public Procurement and Due Process Policy in Nigeria: Thrust, Process, and Challenges. *Peak Journal of Social Sciences and Humanities,* 1(4), 39-45.

Fendt, J. Kaminska-Labbe, R., & Sachs, W. M. (2008). Producing and socializing relevant management knowledge: re-turn to pragmatism. *European Business Review,* 20(6), 471-491.

Fiala, P. (2005). Information sharing in supply chains. *Omega*, 33(5), 419-423.

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics*. 4th edn, Thousand Oaks, CA: Sage.

Fishbein, M. and Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research.*

Foddy, W. (1994). *Constructing questions for interviews and questionnaires: Theory and practice in social research*. Cambridge University press, Cambridge.

Gaith,F.H., Khalim, A. R. & Amiruddin, I.(2012). Application and efficacy of information technology in construction industry. *Scientific Research and Essays*, 7(38), 3223-3242.

GamalAboelmaged, M. (2010). Predicting electronic-procurement adoption in a developing country: an empirical integration of technology acceptance model and theory of planned behaviour. *Industrial Management & Data Systems*, 110(3), 392-414.

Gaskin, J. & Lim, J. (2016). *Model fit measures*. AMOS Plugin. Gaskination's StatWiki.

Gastor J.O. (2019). Factors Affecting Strategic Procurement Practices in Public Procuring Entities in Moshi-Tanzania. *International Journal of Research in Management, Economics and Commerce*, 9(3), 1-9.

Gatignon, H. & Xuereb, J.M. (1997). Strategic orientation of the firm and new product performance. *Journal of Marketing Research*, 34(1), 77-90.

Gebauer, M.J.S. (2002). Introduction to the special section: business-to-business electronic commerce. *International Journal of Electronic Commerce*, 6(4), 7-17.

Gefen, D., Karahanna, E. & Straub, D.W. (2003). Trust and TAM in online shopping: an integrated model. *MIS quarterly*, 27(1), 51-90.

Gefen, D. & Straub, D. (2000). The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption. *Journal of the Association for Information Systems*, 1(8), 1-30.

Gefen, D., Straub, D. W. & Boudreau, M. C. (2000). Structural equation modelling and Regression: guidelines for research and practice, *CAIS*, 4(7), 1-70.

Ghiani, G., Laporte, G. & Musmanno, R. (2004) *Introduction to Logistics Systems Planning and Control*. John Wiley.

Grandon, E. & Pearson, J. M. (2004). E-Commerce Adoption: Perceptions of Managers/Owners of Small and Medium Sized Firms in Chile. *Communications of the Association for Information Systems*. 13(1), 8.

Grant, C. & Osanloo, A. (2014). Understanding, Selecting, and Integrating a TheoreticalFramework in Dissertation Research: Creating the Blueprint for House. Administrative Issues. *Connecting Education, Practice and Research*, 12-22. DOI: 10.5929/2014.4.2.9

Grilo, A. & Jardim-Gonclaves, R. (2011). Challenging Electronic procurement in AEC sector: a BIM –based integrated perspective. Automation in construction, 20(2), 107-114. http://www. Science direct.com/science article/pii/so926580510001378.

Gunasekaran, A., & Ngai, E. W. (2008). Adoption of electronic-procurement in Hong Kong: anempirical research. *International Journal of Production Economics, 113*(1), 159-175.

Gunasekaran, A., McGaughey, R.E., Ngai, E.W.T.& Rai, B.K. (2009). Electronic-procurement adoption in the Southcoast SMEs. *International Journal of Production Economics*, 122, 161-175.

Gupta, A. (2014). E-Commerce: Role of E-Commerce in Today's Business. *International journal of Computing and Corporate Research*, 4 (1), ISSN (Online): 2249-054x.

Gupta, S, Jha, B & Gupta, H (2009). Electronic-procurement: A developing country perspective: A study on new trends concerned with developing countries, *Journal of Business and Economics*, 122(1), 161-75.

Gurakar, E. C., & Tas, B. K. O. (2016) Does Public Electronic-procurement Deliver What It Promises? Empirical Evidence from Turkey. *Emerging Markets Finance and Trade,* 52 (11), 2669-2684.

Hair J. F., Black, W. C., Babin, B. J &Anderson, R. E. (2010). *Multivariate data analysis: a global perspective* (7th Ed.) Pearson Education.

Hair, J. F., Hollingsworth, C. L., Randolph, A. B., & Chong, A. Y. L (2017). An Updated and Expanded Assessment of PLS-SEM in Information Systems Research. *Industrial Management & Data Systems*, 117(3), 442-458.

Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial Least Squares Structural Equation Modelling (Pls-Sem): An Emerging Tool in Business Research. *European Business Review*, 26(2), 106 – 121

Hair, J.F, Sarstedt, M., Pieper, T., & Ringle, C.M., (2012). The use of partial least squares structural equation modelling in strategic management research: a review of past practices and recommendations for future applications. *Long Range Planning*, 45, 320-340.

Hair, J.F., Hult, G.T.M., Ringle, C.M., & Sarstedt, M., (2013). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage, Thousand Oaks.

Hallowell, M. R., & J. Gambatese. (2010). Qualitative research: Application of the Delphi method to CEM research. *J. Constr. Eng.Manage.*, 136 (1), 99–107

Hallowell, M. R., Esmaeili, B. & Chinowsky, P. (2011). Safety risk interactions among highway construction work tasks, *Construction Management and Economics* 29(4), 417–429

Hameed, M.A., Counsell, S. & Swift, S. (2012). A conceptual model for the process of IT innovation adoption in organizations. *Journal of Engineering and Technology management*, 29(3), 358-390.

Harrigan, P., Ramsey, E. &Ibbotson, P. (2011). Critical factors underpinning the e-CRM activities of SMEs. *Journal of Marketing Management*, 27, 503–529.

Hashim, F., Alam, G.M. & Siraj, S. (2010) Information and communication technology for participatory based decision making-E-management for administrative efficiency in Higher Education. *International Journal of Physical Sciences*, 5, 4, 383-392.

Hashim, N., Said, I., & Idris, N. H. (2013) Exploring Electronic-procurement value for construction companies in Malaysia. *Procedia Technology*, 9, 836-845.

Hasson, F., keeney, S. & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of advanced nursing* 32(4), 1008-1015.

Hawking, P., Stein, A., Wyld, D.C. & Foster, S.(2004). Electronic-procurement: Is the ugly duckling actually a swan down under? *Asia Pacific Journal of Marketing and Logistics*, 16 (1), 3–25.

Henriksen, H & Andersen, K. (2003). Electronic-procurement *adoption: Theory and practice*, in JH G. Goos, and J. van Leeuwen (ed.), *Electronic Government*, Springer Berlin , 2739, 121-4.

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J., Hair, J. F., Hult, G. T. M.,& Calantone, R. J.(2014). Common Beliefs and Reality about Partial Least Squares: Comments on Rönkkö & Evermann (2013). *Organizational Research Methods*, 17(2): 182-209.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management & Data Systems*, *116*(1), 2–20. https://doi.org/10.1108/IMDS-09-2015-0382.

Henseler, J., Ringle, C. M. & Sinkovics, R. R. (2009). The use of partial least squares path modelling in international marketing. *Advances in International Marketing,* 20, 277–319.

Henseler, J., Ringle, C.M. & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, 43(1), 115-135

Hesse-Biber, S.N. & Leavy, P. (2010). *The practice of Qualitative research* 2nd Edition. Sage publications Incorporation.

Holey, E.A., Feeley, J.L., Dixon, J. &Whittaker, V.J. (2007). An exploration of the use of simple statistics to measure consensus and stability in Delphi studies. *BMC Medical Research Methodology*, **7**(1), 52.

Hon, C. K. H., Chan, A. P. C. &Yam, M. C. H. (2012). Empirical study to investigate the difficulties of implementing safety practices in the repair and maintenance sector in Hong Kong. *Journal of Construction Engineering and Management* 138(7), 877–884.

Hossain, L., & Silva, A. d. (2009). Exploring user acceptance of technology using social networks. *Journal of High Technology Management Research*, 20, 1-18.

Hoyle, R.H. (2012). *Handbook of Structural Equation Model*. The Guilford Press.

Hsin, C. H., Tsai, Y. C., & Hsu, C. H. (2013) Electronic-procurement and supply chain performance. Supply Chain Management: *An International Journal*, 18(1), 34-51.

HSU, C. &Sandford, B.A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*, 12(10), 1-8.

Hu, L.T &Bentler, P.M (1999). Cut-off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives', Structural Equation Modeling: *A Multidisciplinary Journal*, 6 (1), 1-55.

Huang, D. C., Tran, Q. D., Nguyen, T. Q. T. & Nazir, A. (2016). Initial adoption vs. institutionalization of electronic-procurement in construction firms: The role of government in developing countries. *International Journal of Enterprise Information Systems*, 10 (4), 1-21. http://dx.doi.org/10.4018/ijeis.2014100101.

Hui, W. S., Othman, R., Omar, N. H., Rahman, R. A., & Haron, N. H. (2011). Procurement issues in Malaysia. *International Journal of Public Sector Management*, 24(6), 567-593.

Humphrey, J., Mansell, R., Paré, D. &Schmitz, H. (2004). Reality of e-commerce with developing countries. Obtainable at http://eprints.lse.ac.uk/id/eprint/3710.

Ibem, E.O., Aduwo, E.B., Tunji-Olayeni, P., Ayo-Vaughan, E.A. &Uwakonye, U.O. (2016). Factors influencing e- Procurement adoption in the Nigerian building industry. *Construction Economics and Building*, 16(4), 54-67. DOI: http://dx.doi.org/10.5130/AJCEB.v%25vi%25i.4984.

Ibem,E.O &Laryea, S. (2015). Electronic-procurement use in the South African Construction Industry.*Journal of Information Technology in Construction*,20, 364-384.

Ibrahim, A. D. (2008). A Critique of the Operational Philosophy and Mechanism of Public Procurement Act: Construction Industry Perspective. *NIQS 23rd Biennial Conference.* Held on 3-8 November, 2008 at Hamdala Hotel, Kaduna-Nigeria.

Ibrahim, R., Roy, M.H., Ahmed, Z.U.&Imtiaz, G. (2010). Analyzing the dynamics of the global construction industry: past, present and future. *Benchmarking: An International Journal*, 17(2), 232-252

Idoro, G. I. (2012). The Influenece of Project Documents on the Outcome of Construction Projects Procured by Traditional Contracts in Nigeria. *Journal of Construction in DevelopingCountries*, 17(1), 1-19.

Ikeji.C. (2011) Politics of revenue allocation in Nigeria: A reconsideration of contending Issues. *Sacha Journal of policy and strategic studies*. 1 (1), 121-136

Inzofu, K. M. (2016). *Challenges to implementation of electronic procurement in the construction sector*. An Unpublished dissertation submitted in partial fulfilment of the requirements for the award of master of business administration in procurement and supplies management. School of business and public management of Kenya University

Isikdag, U., Underwood, J., Ezcan, V. &Arslan, S. (2011). Barriers to electronic-procurement
in Turkish AEC Industry. Proceedings of the CIB W78-W102 2011: *International Conference, Sophia Antipolis, France, 26-18 October*

Islam, M. (2015). *An evaluation of risk mitigation strategies through prohibiting corruption, fraudulent, coercion and collusive practices in public procurement act, 2006:* An Unpublished PhD thesis on the study on directorate of primary education BRAC University.

Johnson, M., (2010). Barriers to Innovation Adoption: A Study of e-Markets. *Industrial M & Data Systems,* 110 (2), 157-174.

Johnson, R.B. &Onwuegbuzie, A.J (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher* 33(7), 14-26. Http://www.jstor.org/stable/3700093.*Journal of Operational Research*, 187, 138-161

Johnson, M. (2011) Public sector electronic-procurement: a study of benefits from e-markets in the local government sector. *International Journal of Services Technology and Management,* 16(1), 1-27.

Jokonya, O., Kroeze, J. H., & van der Poll, J. A. (2012). *Towards a framework for decision making regarding IT adoption.* Paper presented at the Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference.

Jusoh, R. & Parnell, J. A. (2008). Competitive strategy and performance measurement in the Malaysian context. *Management Decision,* 46(1), 5-31.

Kagioglou, M., Cooper, R., Aouad, G. & Sexton, M. (2000). Rethinking construction: the generic design and construction process protocol. *Engineering construction and architectural management*, 7(2), 141-153.

Kahiu, B. K. (2015). Determinants of implementation of e- procurement in procuring entities at the country level in Kenya (case study of Lamu county service delivery coordinating unit). *International journal of scientific and research publications*, 5(9), 1-15.

Kaiser, H. F. (1974).An index of factorial simplicity. *Psychometrika*, 39(1), 31-36.

Kajewski, S.L, Tilley, P.A, Crawford, J.R, Remmers, T.R, Chen, S-E, Lenard, D, Brewer, G, Weippert, A, Caldwell, G & Haug, M. (2001). *Electronic tendering: An industry perspective*, QUT, <http://eprints.qut.edu.au/7987/1/7987.pdf>.

Kangongo J. & Gakure, R. (2013). *Factors affecting electronic procurement implementation in automobile industry of Kenya.* Unpublished thesis Jomo Kenyatta University of Agriculture and Technology, Kenya.

Karakaya, F. & Shea, T. (2008). Underlying motivations for establishing e-commerce business and their relationship to e-commerce success. *Journal of Internet Commerce*, 7(2), 153-179.

Karanasios, S. &Burgess, S. (2008). Tourism and Internet adoption: a developing world perspective. *International Journal of Tourism Research*, 10(2), 169-182.

Kari, H., Mona, F., & Jan, I. (2010.) *The basics of integrity in procurement:* A guide Book. Michelsen Institute;

Karjalainen, K.&Kemppainen, K. (2008). The involvement of small-and medium-sized enterprises in public procurement: Impact of resource perceptions, electronic systems and enterprise size. *Journal of Purchasing & Supply Management* 14, 230–240.

Kazaz, A. &Ulubeyli, S. (2009). Strategic management practices in Turkish construction firms. *Journal of Management in Engineering*, 25(4), 185-194.

Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioural research* (4th Ed.). Harcourt College Publishers.

Kheng C. & Al-hawamdeh S. (2002). The Adoption of Electronic Procurement in Singapore, *Electronic Commerce Research*, 2, 61-73.

Kim, D. &Benbasat, I. (2009). Trust-assuring arguments in B2C e-commerce: impact of content, source, and price on trust. *Journal of Management Information Systems*, 26(3), 175-206.

Kim, J.-I. &Shunk, D.L.(2004) . Matching indirect procurement process with different B2B electronic-procurement systems. *Computers in Industry*, 53 (2004), 153-164. Available online at www.sciencedirect.com. Assessed on 8th May, 2018.

Kim, M. J. Chi, H., Wang, X. &Ding, L. (2015). Automation and Robotics in Construction and Civil Engineering, *J. Intell. Robot. Syst.* 79(3-4) (2015) 347-350.

Kline, R. B. (2010). *Principles and Practice of Structural Equation Modelling.* 3rd ed. The Guilford Press.

Knight, A. D. & Turnbull, N. (2008). Epistemology. In: A.D. Knight and L.Ruddock, eds, *Advanced research methods in the built environment.*Wiley Blackwell. ISBN 9780000000000.

Knudsen, D. (2003). Aligning corporate strategy, procurement strategy and electronic-procurement adoption in the south coast SMEs. *International journal of physical Distribution and logistics management,* 33(8), 720-734.

Kopczak, L.R. & Johnson, M.E. (2003). The supply-chain management effect. *MIT Sloan Management Review*, 44(3), 27-34.

Korir, S., Afande, F. O. & Maina, M. P. (2015). Constraints to effective Implementation of electronic-procurement in the public sector: A survey of selected Government ministries in Kenya. *Journal of information engineering and application*, 5(4), 59-83.

Kottemann, J. E. (2009). The effects of technological, institutional and fiscal readiness on the extent of nation's e-government. *Electronic government, an international journal*, 6(3), 327-341.

Kshetri, N. (2007). Barriers to e-commerce and competitive business models in developing countries: A case study. *Electronic Commerce Research and Applications*, 6, 443-452.

Kurbel, K. E. (2013). *Enterprise Resource Planning and Supply Chain Management*. Progress in IS,Heidelberg.

Laryea, S. &Ibem, E.O (2014). Patterns of technological innovation in the use of e-procurement in construction. *Journal of Information Technology in Construction*, 19,104-125.

Lederer, L.A., Maupin, D. J., Sena, M. P, & Zhuang, Y. (2001). The Search for Strategic Advantage from the World Wide Web, *International Journal of Electronic Commerce*, 5(4).

Lee, J., Cho, H., Gay, G., Davison, B., & Ingraffea, T. (2003). Technology acceptance and social networking in distance learning. *Education Technology & Society*, 6(2), 50-61.

Lee, S. G., Trimi, S., & Kim, C. (2013). The impact of cultural differences on technology adoption. *Journal of World Business*, 48(1), 20-29.

Lee, H. Y., & Wang, N. J. (2013) "The implementation of integrating electronic-procurement, e-Contracting and e-Invoice platforms for the B2B E-Market Place web-based system" *International Journal of Engineering Research*, 2(4), 300-309.

Leedy, P.D., & Ormrod, J.E (2005). *Practical Research: Planning & Design.* 8th edition. New Jersey: Pearson Prentice Hall.

Lester, F. (2005). On the Theoretical, Conceptual, and Philosophical Foundations forResearch in Mathematics Education. *ZDM,* 37(6), 457-467.

Liao, S., Cheng, C., Liao, W. &Chen, I. (2003). A web based architecture for implementing electronic procurement in military organizations. *Technovation*, 33, 521-532

Liker, J.K. &Choi, T.Y., 2004. Building deep supplier relationships. *Harvard business review*, 82(12), 104-113.

Liu, H., Ke, W., Wei, K. K., & Hua, Z. (2013). The impact of IT capabilities on firm performance: The mediating roles of absorptive capacity and supply chain agility. *Decision Support Systems*, 54(3), 1452-1462.

Lleras, C. (2005). Path analysis. *Encyclopaedia of Social Measurement*, 3, 25-30.

Lloyd, R. E. & McCue, C. P. (2004). 'What is public procurement? Definitional problems and implications', *paper presented to International Public Procurement Conference Proceedings, Seoul*, South Korea.

Loo, R., (2002). The Delphi method: A powerful tool for strategic management. Policing: *An International Journal of Police Strategies & Management*, 25(4), 762-769.

Lou, E. C. W. (2010). E-readiness: how ready are UK construction organizations to adopt IT. In: Egbu, C. (Ed) *Procs 26th Annual ARCOM Conference, 6-8 September 2010, Leeds, UK, Association of Researchers in Construction Management, 947-956.*

Love, P.E.D; Davis, P., Baccarini, D., Wilson, G., & Lopez, R. (2008) Procurement Selection in the Public Sector: A Tale of Two Status. In: Clients Driving Innovation: Benefitting from Innovation conference, 12-14 March 2008, Gold Coast, Australia. Https://eprints.qut.edu.au/27175

MacManus, S.A., (2002). Understanding the incremental nature of electronic-procurement implementation at the state and local levels. *Journal of Public Procurement*, 2 (1), 5-28.

Madzinga, T.,Sibanda, V. & Munuhwa, S. (2020). E- Procurement as a strategic sourcing tool in the beverage industry in Zimbabwe. https://doi.org/10.11114/bms.v6i2.4896.

Mahdillou, H. &Akbary, J. (2014). *Electronic-procurement adoption, its benefits and costs: supply chain management.* B.Sc. thesis submitted to the school of Engineering, University of Boras.

Mahmood, S. A. I. (2010). Public procurement and corruption in Bangladesh confronting the challenges and opportunities'. *Journal of public administration and policy research*, 2(6), 103-111.

Makau, J. K., (2014). Challenges facing adoption of electronic procurement in public sector in Kenya: A case of Nairobi Water and Sewerage Company. *International Journal of Social Sciences and Entrepreneurship*, 1 (11), 267-286.

Maleki, M., Karimi, M., Reyan, H.& Cruz-Machado, V. (2017). Electronic-procurement Platform Implementation Feasibility Study and Challenges: A Practical Approach in Iran. *In Proceedings of the Tenth International Conference on Management Science and Engineering Management (843-855). Springer, Singapore.*

Malik, S. (2014). How to Build and Manage Strong Customer Relationships (CRM) with the Help of Social Media.https://urn.fi/URN:NBN:fi:amk-2014060411812.

Malone, T., Yates, J. & Benjamin, R. (1987). Electronic markets and electronic hierarchies: effects of information technology on market structure and corporate strategies. *Communications of the ACM,* 30, (6), 484-497.

Manoliadis, O., Tsolas, O. & Nakou, A. (2006). Sustainable construction and drivers of change in Greece: A Delphi Study. *Construction management and Economics*, 24(2), 113-120.

Martens, B. (2013). What does economic research tell us about cross-border E-commerce in the EU Digital single market? http://dx.doi.org/10.2139/ssrn.2265305.

Masudin, I., Aprillia, G.D., Nugraha, A. & Restuputri, D. P. (2021). Impact of Electronic-procurement Adoption on company performance: Evidence from Indonesian manufacturing industry. *Logistics,* 5, 16. https//doi.org/10.3390/logistics5010016.

Mbamali, I. & Okotie, A. J. (2012). An Assessment of the Threats and Opportunities of Globalization on Building Practice in Nigeria. *American International Journal of Contemporary Research,* 4, 143-150.

McConell, D. J. (2009). *An analysis into the factors affecting the uptake of applications of Electronic-procurement, within the UK public sector.* An unpublished Doctoral thesis submitted in partial fulfilment of the requirements for the award of the degree of doctor of philosophy of Loughborough University.

McCormack, K. P., & Johnson, W. C. (2016). *Supply chain networks and business process orientation: advanced strategies and best practices*. London: CRC Press.

McDonald, S. (2017). It's time to embrace IoT in construction. *ENR: Engineering news-record, L13-*.*

McKenna, H.P. (1994). The Delphi technique a worthwhile research approach for nursing? *Journal of advanced nursing*, 19(6), 1221-1225.

McMillan, J. H. & Schumacher, S. (2001). *Research in education: a conceptual introduction* 5th ed., Suny press.

McPheraon, C & Mac Searraigh, S. (2007). Corruption in the petroleum sector, in SP J. Edgardo (ed.), *The Many Faces of Corruption*, World Bank Publications, Washington, D.C.

Mehrtens, J., Cragg, P. & Mills, A. (2001). A model of Internet adoption by SMEs. *Information &Management,* 39,165-176.

Mertens, D. M. (2007) 'Integrating diversity with Quantitative and Qualitative Approaches'. *Research Methods in Education and Psychology* (2nd Ed.) Thousand Oaks: Sage

Minahan, T. & Degan, G. (2001). Best practices in electronic-procurement, Boston. www.hedgehog.com/resources/electronic-procurementAbridged.pdf.

Mohamed, K. A., & Milimu, C. (2016). Factors Contributing to Adoption of Electronic-procurement in County Governments (A Case Study of County Government of Mombasa). *Imperial Journal of Interdisciplinary Research*, 2(10).

Mojtahedi, S.M.H. (2015). *Stakeholder Attributes and Approaches in Natural Disaster Risk Management in the Built Environment: The Case of Flood Risk Management in Transport Infrastructure.* An unpublished PhD thesis submitted to the School of civil engineering, Faculty of engineering and IT, The University of Sydney, Australia.

Molla, A. & Licker, P.S. (2005). Perceived E-Readiness Factors in E-Commerce Adoption: An Empirical Investigation in a Developing Country. *InternationalJournal of Electronic Commerce*, 10 (1), 83-110.

Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2015). *Purchasing and supply chain management.* (4th Ed.). Cengage Learning.

Monfared, J. H. & Derakhshan, H. (2015). Comparison Qualitative and Quantitative Research. *Indian journal of fundamental and applied life sciences*, 5 (52), 1111 - 1117.

Moon, M. J. (2005). Electronic-procurement management in state governments: diffusion of Electronic-procurement practices and its determinants. *Journal of Public Procurement* 5 (1), 54-72.

Mosaku, T. O., Kehinde, J. O. & Kuroshi, P. A. (2006). Control of Building Practice for Sustainable Development in Nigeria: Matters Arising. *Proceeding of the International Conference on the Built Environment; Innovation, Policy and Sustainable Development.* Department of Architecture, Covenant University, Ota, Nigeria, 24-26 January, 26 – 33.

Moses, J. M., Njihia, J. M. & Peterson, O. M. (2013). The critical success factors and challenges in Electronic-procurement adoption among large-scale manufacturing firms in Nairobi, *Kenya. European Scientific Journal*, 9, 13,375-401

Moturi, C. & Sang, J. (2016) Predicting Electronic-procurement Utilization in Independent Commissions in Kenya. International *Journal of Applied Information Systems (IJAIS).* 10, 5, 12-17 – ISSN: 2249-0868.

Muffatto, M., & Payaro, A. (2004). Integration of web-based procurement and fulfillment: A comparison of case studies. *International Journal of Information Management, 24*(4), 295-311.

Muk, S, Marovic, J, Popovic, M, Tepavcevic, N & Sošić, M. (2012). *Corruption and public procurement in Montenegro*, 300 edn, Podgorica, Montenegro: Institute Alternative.

Mundfrom, D., Shaw, D., & Ke, T. (2005). Minimum sample size recommendations for conducting factor analyses. *International Journal of Testing*, 5(2), 159-168.

Mundy, D & Musa, B (2010). Towards a Framework for e-Government Development in Nigeria. *Electronic Journal of e-Government*, 8(2), 148-161.

Musau, G., (2015). Inventory Optimization: A Factor Affecting Electronic-procurement Performance of State Parastatals in Kenya. *Journal of Business and Management,* (17)4, 41-50

Nadi, E. O. E. (2009).*Curbing corruption in public procurement process in Nigeria*. A Masters Thesis submitted to the Department of Building, Nnamdi Azikiwe

University,Awka,Nigeria;Available:http://www.naulibrary.org/dglibrary/admin/book_directory/Thesis/10032.pdf

Nandakumar, M. K. (2008). *Strategy formulation and implementation inmanufacturing Organisations - the impact on Performance.* Unpublished thesis submitted to Middlesex University in partial fulfilment of the requirements for the degree of Doctor of Philosophy, Middlesex University Business School, London, UK.

Narayanasamy, K., Santhapparaj, A., & Eze, U. (2008). An Empirical Study of Website Adoption among Small and Medium Enterprises (SMEs) in Malaysia. *Comm. of the IBIMA*, 2, 50-62.

National Integrity Systems (2004). "Integrity Systems: Transparency International Country Study Report." [Online]. http://www.transparency.org/policy_research/nis/nis_reports_by _country.

Nawi, M. N. M., Nifa, F. A. A., & Ahmed, V. (2014). A review of traditional project procurement towards integrated practice. *American-Eurasian Journal of Sustainable Agriculture,* 65-71.

Nawi, M. N. M., Deraman, R., Bamgbade, J.A., Zulhumadi, F. & Riazi, S.R. M. (2017). Electronic-procurement in Malaysian Construction Industry: Benefits and challenges in Implementation. *International journal of supply chain management,* 6(1), 209-213.

Neupane, A. (2014). *The potential of public electronic-procurement technology to reduce corruption in public procurement.* An unpublished PhD dissertation submitted to School of Management and Enterprise, Faculty of Business, Education, Law and Arts. University of Southern Queensland, Australia.

Neupane, A., Soar, J., Vaidya, K., & Yong, J. (2012, August). Role of public electronic-procurement technology to reduce corruption in government procurement. *In Proceedings of the 5th International Public Procurement Conference* (IPPC5) (pp. 304-334). Public Procurement Research Center.

Odediran, S. J., Adeyinka, B. F., Opatunji, O. A., & Morakinyo, K. O. (2012). Business Structure of Indigenous Firm in the Nigerian Construction Industry. *International Journal of BusinessResearch and Management*, 3 (5), 255-264.

Ogunsanmi, O.E. (2013). Effects of Procurement Related Factors on Construction Project Performance in Nigeria. *Ethiopian Journal of Environmental Studies and management*. 6(2), 215-222.

Ojo, L. & Ogunsemi, D. (2019), Critical drivers (CDs) of value management adoption in the Nigerian construction industry. *Journal of Engineering, Design and Technology*, 17(1), 250-264

Ojo, O.J. (2016). Assessment of implementation of public procurement reform in Oyo state, Nigeria.*Jorind* 14(2). www.ajol.info/journals/jorind.

Oke, A. E., Aghimien, D. O., Aigbavboa, C. O. & Koloko N. (2018). Challenges of Digital Collaboration in the South African Construction Industry. *Proceedings of the International Conference on Industrial Engineering and Operations Management Bandung, Indonesia,* March 6-8, 2472 – 2482

Oladapo, A.A. (2007). An investigation into the use of ICT in the Nigerian construction industry. *Journal of Information Technology in Construction*, 12, 261-277

Olatunji, O. A. & Bashorun, N. (2006). A system view of the labour profile structure of the construction industry in the developing countries: *proceedings at the International Conference in the Built Environment in the 21st Century* (ICUBE 2006). Renaissance Kuala Lumpur Hotel Malaysia (13th -15th June 2006)

Olatunji, S.O., Olawumi, T.O. & Aje, I.O. (2017). Rethinking Partnering among Quantity-Surveying Firms in Nigeria. *Journal of Construction and Engineering Management.*, 143(11), 1-12

Oluwakiyesi, T. (2011). Nigeria's construction sector – A dissecting look. [Online] Availableat:http://www.proshareng.com/admin/upload/reports/VetivResearchConstructioSectorReport May2011.pdf .

Ongori, H. and Migiro, S.O. (2010).information and communication technologies adoption in SMEs: literature review. *Journal of Chinese entrepreneurship*, 2(1), 93-104.

Onwubiko E. (2018). Weak public procurement breeds corruption. https://guardian.ng/issue/weakpublic- procurement-breeds-corruption/.

Onyekpere E. (2009).*Public Procurement Reports*, Abuja Centre for Social Justice.

Oppenheim, A. N. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. London: Pinter.

Organization for Economic Co-operation and Development (OECD) and Asian Development Bank (ADB) (2008). Fighting bribery in public procurement in Asia-Pacific,Http://www.etransform.org/gti/sites/etransform.org/files/Documents/bribery.pdf>.

Organization for Economic Co-operation and Development (OECD) (2013). Public Procurement Review of the Mexican Institute of Social Security and Services for State Workers (ISSSTE) (2013). http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=GOV/PGC/ETH(2013)4&docLanguage=En

Osei, V. (2013). The Construction Industry and Its Linkages to the Ghanaian Economy-Polices to Improve the Sector's Performance. *International Journal of Development and Economic Sustainability*, 1(1), 56-72.

Oseni, G., Goldstein M. & Utah, A (2013). Gender Dimensions in Nigerian Agriculture. African region gender practice policy brief; No. 6. World Bank Washington Dc. https://openknowledge.worldbank.org/handle/10986/25459.

Oseni, K. O. & Dingley, K. (2014). Challenges of e-Service Adoption and Implementation in Nigeria: Lessons from Asia. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 8 (12), 3956-3963

Oshodi, O. S., Ejohwomu, O. A., Famakin, I .O. & Cortez, O. (2017). Comparing univariate techniques for tender price index forecasting: Box-Jenkins and neural network model. *Construction Economics and Building*, 17(3), 109-123

Osoba, S.E. (2016). Procurement specialist solutions and innovations in public procurement, the World Bank. wbnpf. Procurement .org.

Ossai .T O. (2014) A Review of Nigeria Procurement Process http://saharareporters.com/2014/03/31/callreview-nigeria%E2%80%99s procurement-process-tony-osborg-ossai. Retrieved 18/05/2018

Outhred, G. P. (2001).The Delphi method: a demonstration of its use for specific research types. *Proceedings of the RICS foundation. Construction and Building.*

Oyebamiji, F. F.(2018). Implementation of Public Procurement Act and Government Performance: Evidence from Nigeria. *South Asian Journal of Social Studies and Economics*, 1(4), 1-9.

Oyediran, O. S., & Akintola, A. A. (2011). A survey of the state of the art of E-Tendering in Nigeria. *Journal of Information Technology in Construction,* 16, 557–576.

Oyewobi, L.O. (2014). *Modelling performance differentials in large Construction organisations in South Africa*. A PhD thesis submitted to the Department of Construction Economics and Management,Faculty of Engineering and the Built EnvironmentUniversity of Cape Town, South Africa

Oyewobi, L.O., Windapo, A.O., Rotimi, J.O.B. & Jimoh, R.A. (2016), Relationship between competitive strategy and construction organisation performance: The moderating role of organisational characteristics, *Management Decision*, 54 (9), 2340-2366. https://doi.org/10.1108/MD-01-2016-0040.

Pallant, J. (2011). *SPSS survival manual: Step by step guide to data analysis using SPSS*. 4th edn. Sydney: Unwin.

Panayiotou, N.A., Gayaialis, S.P. & Tatsiopoulos, I.P. (2014). An electronic-procurement system for governmental purchasing. *International Journal of Production Economics* 90, 79–102.

Parida, V., & Sophonthummapharn, K. (2010). The effect of benefits and risks on electronic-procurement implementation: an exploratory study of Swedish and Indian firms. *International Journal of Information and Communication Technology,* 2(3), 186-201.

Patel, P.H. (2017). *A Study of Electronic-procurement Practices in Selected Organizations in Gujarat.* An unpublished PhD thesis submitted to Gujarat Technological University. Ahmedabad.

Pathirage, C.P., Amarantunga, R.D.G. & Haigh, R.P. (2008). The role of philosophical context in the development of research methodology and theory. *The built and human environment review* 1(1), 1-10.

Parveen, F. T. (2014). *Social media usage and its impact on Malaysian organizations.* An unpublished PhD thesis submitted to the faculty of business and accountancy university of malaya, kuala lumpur.

Pekuri, L., Pekuri, A. & Haapasalo, H. (2014) Analysing the problem of procurement in construction. *Proceedings IGLC-22 Oslo*, Norway.

Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly*, 31(4), 623-656.

Pictet, J. & Bollinger, D. (2008). Extended use of the cards procedure as a simple elicitation technique for MAVT. Application to public procurement in Switzerland. *European Journal of Operational Research*, 185 (3), 1300-7.

Porwal, A., & Hewage, K. N. (2013). Building Information Modeling (BIM) partnering framework for public construction projects. *Automation in construction*, 31, 204-214.

Presutti, W. D. Jr., (2003). Supply management and electronic-procurement: creating value added in the supply chain. *Industrial Marketing Management*, 32, 219-226.

Quangdung, T., Dechun, H., Binhsheng, L. & Hossain Md. E. (2011). A construction enterprise's readiness level in implementing eprocurement: a system engineering assessment model. *Systems Engineering Procedia*, 2, 131-141.

Quinton, S., Canhoto, A., Molinillo, S., Pera R., & Budhathoki, T. (2018). Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy. *Journal of Strategic Marketing*, 26(50), 427-439.

Qrunfleh, S. & Tarafdar, M. (2014). Supply chain information systems strategy: Impacts on supply chain performance and firm performance. *International Journal of Production Economics*, 147, 340-350.

Rajasekar, S., Philominathan P. & Chinnathambi V. (2013). Research methodology. arXiv:physics/0601009v3 [physics.ed-ph]

Rankin, J., Chen, Y. & Christian, A. (2006) Electronic-procurement in the Atlantic Canadian AEC industry. *Journal of Information Technology in Construction*, 11, 75-87

Rasheed, H. S. (2004). Capital Access Barriers to Public Procurement Performance: The Moderating Effects of Ethnicity, Gender and Education. *Journal of Developmental Entrepreneurship*, 9(2), 22-43.

Ravitch, S. M. & Carl, N. M. (2016). *Qualitative Research: Bridging the Conceptual, Theoretical and methodological*:Sage publications Inc.

Rayens, M.K. & Hahn, E.J., (2000). Building consensus using the policy Delphi method. *Policy politics nursing practice*, 1(2), 308-315

Raykov T, & Marcoulides G. A (2011). *Introduction to Psychometric Theory*. New York, NY: Routledge, Taylor & Francis Group.

Reich, A. (2009). The New Text of the Agreement on Government Procurement: An Analysis and Assessment: *Journal of International Economic Law,* 12 (4), 989–1022.

Redmond, A., Hore, A., Alshawi. M. & West, R. (2012). Exploring how information exchanges can be enhanced through cloud BIM. *Automation in construction*, 24,175-183.

Richter, N.F., Sinkovics, R.R., Ringle, C.M. & Schlägel, C. (2016). A critical look at the use of SEM in international business research. *International Marketing Review,* 33, 376-404.

Ringle, C.M., Sarstedt, M., Mitchell, R. & Gudergan, S.P. (2019), Partial least squares structural equation modelling in HRM research, *The International Journal of Human Resource Management*, 31(12), 1617-1643.

Rogers, E.M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. *Die Diffusion von Innovationen in der Telekommunikation*, 17, 25-38.

Rogers, E. (2003). *Diffusion of Innovations*, 5th ed.; Free Press.

Ronchi, S., Brun, A., Golini, R.& Fan, X. (2010). What is the value of IT electronic-procurement System? *Journal of purchasing and supply management*, 16(2), 131-140.

Rowe, G. & Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International journal of forecasting*, 5, 353-375.

Ruane, J. M. (2011). *Essentials of research methods*. Chicago

Saaty, T. L. (1994) *Fundamentals of Decision Making and Priority theory with Analytical Hierarchy Process,* Vol. VI.RWS Publications.

Sabherwal, R., Jeyaraj, A. & Chowa, C. (2006). Information system success: Individual and organizational determinants. *Management science,* 52(12), 1849-1864.

Sacks, R. & Barak, R. (2010). Teaching building information modelling as an integral part of freshman year civil engineering education. *Journal of professional issues in engineering education and practice,* 136(1), 30-38.

Saidu, I. (2016). *Management of material waste and cost overrun in the Nigerian Construction Industry*. An Unpublished PhD thesis submitted to Department of Construction Management, School of the Built Environment, Faculty of Engineering, the Built Environment and Information Technology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.

Saka, N.& Lowe, J. (2010).An assessment of linkages between the construction sector and other sectors of the Nigerian economy. *The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors*. Held at Dauphine Université, Paris, 2-3 September 2010.

Salkute, V. R. (2013). Exploratory study of electronic-procurement adoption in Indian and Chinese companies: case study with innovation approach. *American Journal of Economics and Business Administration,* 5(3), 107.

Sarosa, S. & Zowghi, D. (2003). Strategy for adopting information technology for SMEs: Experience in adopting email within an Indonesian furniture company. *Journal of InformationSystemsEvaluation,* 6(2), 165- 176.

Saunders, M., Lewis P. & Thornhill, A. (2009). *Research Methods for Business Students*. Prentice Hall Inc.

Schober, P., Boer, C. & schwarte, L. A. (2018). Correlation Coefficients: Appropriate use and Interpretation. *Anaesthesia &Analgesia*, 126(5), 1763-1768.

Schoenherr, T. & Tummala, V. M. R. (2007). Electronic procurement: a structured literature review and directions for future research. *International journal of procurement management,* 1(2), 8-37.

Schuberth, F., RAdemaker, M.E. & Henseler, J. (2022). Assessing the overall fit of composite models estimated by partial least squares path modelling. European *Journal of Marketing*. https://doi.org/10.1108/EJM-08-2020-0586.

Scupola, A. (2009). SMEs e-commerce adoption: perspectives from Denmark and Australia. *Journal of Enterprise Information Management*, 22(1/2), 152-166.

Selnes, F. & Sallis, J. (2003). Promoting relationship learning. *Journal of marketing*, 67(3), 80-95.

Shahkooh, K. A., Saghafi, F. & Abdollahi, A. (2008). A proposed model for e-government maturity. *2008 3rd international conference on information and communication technologies: from theory to applications, 1-5.*

Shalle, N. I., Guyo, W., & Amuhaya, I. M. (2013). Factors Affecting Implementation of Electronic-procurement Practices in Public Service in Kenya: A Case of Ministry of Finance. *International Journal of Science and Research,* 2(8), 307-312.

Sharabati, M. M., Sulaiman, A. & Salleh, N. A. M. (2015). End user satisfaction and individual performance assessments in e- procurement systems. *International journal of computer theory and engineering,* 7(6), 503.

Siahaan, A. Y. & Trimurni, F. (2016). Electronic-procurement Policy Model: Striving towards Transparency in Goods and Services Procurement in North Sumatera Indonesia. *Public Policy and Administration Research*, 4(12), 17-29.

Singer, T. (2003).MROelectronic-procurement: where is it now? *Plant engineering*, 57(1), 28-29.

Singh, I. & Punia, D.K. (2011). Employees Adoption of Electronic-procurement System: An Empirical Study. Retrieved from www.emeraldinsight.com.

Singh, G. (2018). A Simple Introduction to ANOVA (with applications in Excel). Https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/.

Sitar, C. P. (2011). The Barriers of Implementing Electronic-procurement.*Studia Universitatis "Vasile Goldis" Arad- Seria StiinŃe Economice,* 21(2), 120-124.

Soares-Aguiar, A. & Palma-Dos-Reis, A. (2008), "Why do firms adopt electronic-procurement systems? Using logistic regression to empirically test a conceptual model", *IEEE Transactions on Engineering Management,* 55,120-33.

Sohail, M. & Cavill, S. (2008). Accountability to prevent corruption in construction projects', *Journal of Construction Engineering and Management,* 134, (9),729-38.

Sope, W. (2015). A comparative analysis of the Nigerian Public procurement Act against international best Practice. *Journal of African law*, 59, 85-98

Sosik, J.J., Kahai, S.S. & Piovoso, M.J. (2009). Silver bullet or voodoo statistics? A primer for using the partial least squares data analytic technique in Group and Organization Research. *Group and Organization Management,* 34(1), 5-36.

Stevens, J. P. (2012). *Applied Multivariate Statistics for the Social Sciences*. 5th edn. London: Routledge.

Streiner (1994). Figuring out factors: the use and misuse of factor analysis. *Canadian Journal of Psychiatry,* 39(3), 135-140.

Subramanian, C. & Shaw, M. A. (2002). A study of the value of B2B e-commerce: the case for web procurement. *International journal of electronic commerce,* 6(6), 19-40.

Suleiman, A. (2015). The impact of Project Risk Factors on the Selection of Public works Procurement Methods in Ghana. A focus on NCT. Kwame Nkrumah University of Science and Technology, Kumasi. Retrieved on: 24th of February 2021 from: citeseerx.ist.psu.edu>viewdoc>download.

Szymanski, S. (2007). *How to implement economic reforms: How to fight corruption effectively in public procurement in SEE countries*. OECD.

Tabachnick, B. G. & Fidell, L. S. (2014) *Using Multivariate Statistics*. 6th edn. Harlow:Pearson Education.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. 5th edition Boston, Pearson Education Inc.

Tajudeen, F.P. (2014). *Social Media Usage and its Impact on Malaysian Organizations.* An Unpublished PhD thesis submitted to the faculty of business and Accountancy University of Malaya Kuala Lumpur.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: combining qualitative and quantitative approaches.* Sage.

Tatsis, V., Mena, C., Van Wassenhove, L. N., & Whicker, L. (2006). Electronic-procurement in the Greek food and drink industry: Drivers and impediments. *Journal of Purchasing and Supply Management, 12*(2), 63-74. doi: http://dx.doi.org/10.1016/j.pursup.2006.04.003

Tavallaei, M. & Abu Talib, M. (2010). A general perspective on role of theory in qualitative research. *Journal of international social research,* 3(11), 570-577.

Teddlie, C. & Tashakkori, A. (2011). Mixed methods: Contemporary issues in an yuemerging field. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (4thEd.). Sage.

Teece, D. J., Pisano, G. & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal,* 18(7), 509-533.

Teo, S., Lin, S., & Lai, H. (2009). Adopters and non-adopters of electronic-procurement in Singapore: an empirical study. *Omega,* 37(5), 972-987.

Thai, K.V. (2005). Public procurement re-examined. *Journal of Public Procurement,* 1(1), 9-50.

Thakur, R., Hsu, S. H. Y., & Fontenot, G. (2012). Innovation in healthcare: Issues and future trends. *Journal of Business Research*, 65, 562-569.

Tornatzky, L.G., Fleischer, M. & Chakrabarti, A.K. (1990). *Processes of technological innovation*. Lexington Books.

Tran, Q. D. & Huang, D. C. (2014). Electronic procurement institutionalization in construction industry in developing countries. A model and instrument. *Wseas transactions on computers,* 13, 152-176.

Tran, Q. D., Huang, D. C., Liu, B. & Ekram, H.M (2011). A construction enterprise's readiness level in implementing e procurement: a system engineering assessment model. *Systems Engineering Procedia,* 2 (2011), 131 – 141.

Tymvios, N. & Gambatese, J.A. (2016). Direction for Generating Interest for Design for Construction Worker Safety—a Delphi Study. *J. Constr. Eng. Manage.,* 142(8), 1-11

Udoma, U., & Belo-Osagie. (2012). Public Procurement- NIGERIA. Lex Mundi Publication. Lex Mundi Ltd. http://www.lexmundi.com/Document.asp?DocID=4978.

United Nation (1999). Procurement reforms: Resolution / adopted by the general assembly (A/ RES/54/866).

Vaidya, K. (2007). *Electronic procurement in the Australian public sector: The organizational assimilation process and its impact on public procurement performance.* An Unpublished PhD thesis submitted to the University of New England.

Vaidya, K., Sajeev, A. & Callender, G. (2006). Critical factors that influence electronic-procurement implementation success in the public sector. *Journal of public procurement* 6(1/2), 70-99.

Van Weele, A. J. (2005). *Purchasing and Supply Management. Analysis, Strategy, Planning and Practice*. Thomson Learning.

Venkatesh, V. & Davis, F.D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 46(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Towards a Unified View. *MIS Quarterly*, 27(3), 425-478.

Vogt, W.P., Gardner, D.C. &Haeffele, L.M. (2012). *When to use what research design*. The Guilford press.

Wahab, A.B & Lawal, A.F (2011). An evaluation of waste control measures in Construction Industry in Nigeria. *African Journal of Environmental Science and Technology*, 5 (3), 246-254.

Wahab K.A. (2006), "Importance of Due Process in University Governance", http://www.unijos.edu.ng/Partnership/Advancements/Advancement%20home_files/JOS%20SPEECH.ppt.

Wamba, S.F., Lefebvre, L.A., Bendavid, Y.& Lefebvre, E., (2008). Exploring the impact of RFID technology and the EPC network on mobile B2B e Commerce: a case study in the retail industry. *International Journal of Production Economics* 112, 614–629.

Ware, G.T, Moss, S., Campos, J. E & Noone, G. P. (2012). Corruption in procurement, in A. Graycar & R. Smith (eds), *Handbook of Global Research and Practice in Corruption*, illustrated edition. Edward Elgar Publishing.

Wase, H. H. (2004). National construction policy and the national vision 2010. *Journal of the Nigeria association of quantity surveying students, Minna, Nigeria*, 3(2), 9-10.

Weilbach, L. & Byrne, E. (2010). A human environmentalist approach to diffusion in ICT policies: a case study of the FOSS policy of the South African Government. *Journal of Information, Communication and Ethics in Society*, 8(1), 108-123.

Wen, W.&Wei, L.(2007). Decision-making analysis of electronic-procurement with the rough set theory. *Paperpresentedat International ConferenceonWirelessCommunications,Networking and Mobile Computing, Shanghai*, 21-25 September 2007.

Wilson, H., Daniel, E. & Davies, I.A.(2008). The diffusion of e-commerce in UK SMEs. *Journal of marketing management*, 24(5-6), 489-516.

Winkelhaus, S. & Grosse, E. H. (2020). Logistics 4.0: a systematic review towards a new logistics system. *Internationaljournal of production research*, 58(1), 18-43

Wong, C. H. & Sloan, B. (2004). Use of Ict for Electronic-procurement in the Uk construction industry. A survey of SMEs readiness. In khosrowshahi F(Ed), 20th Annual ARCOM conference 1-3 September. Heriot Watt University. *Association of Researchers in construction management*, 1, 622-630.

Wong, K.K. (2013). Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS. *Marketing Bulletin*, 24, 1-32.

Woudenberg, F. (1991). An evaluation of Delphi. *Technological forecasting and social change,* 40(2), 131-150.

Xie, X. (2002). *Communications in construction Design.* An unpublished PhD thesis submitted to Loughborough University, Loughborough.

Yan, H. & Damian, P. (2008). Benefits and barriers of building information modelling. IN: *Ren, A., Ma, Z. and Lu, X. Proceedings of the 12th International Conference on Computing in Civil and Building Engineering (ICCCBE XII) and 2008 International Conference on Information Technology in Construction (INCITE 2008)*, Beijing, China, 16th-18th October.

Yogita, M. W., Nikhil, B., & Wagh, S.V. (2016). Analysis of the Factors Affecting Stakeholder Management Process in Building Constriction Project. *International Journal of Innovative Studies in Science and Engineering Technology*, 2 (7), 48 – 56.

Yousafzai, S.Y., Foxall, G.R. & Pallister, J.G. (2007). Technology acceptance: a meta-analysis of the TAM: part 2. *Journal of Modelling in management*, 2(3), 281-304.

Yu, C.S. (2005). Causes influencing the effectiveness of the post-implementation ERP system. *Industrial Management & Data Systems*, 105(1), 115-132.

Yu, A. T., & Shen, G. Q. (2013). Problems and solutions of requirements management for construction projects under the traditional procurement systems. *Facilities,* 31(5/6), 223-237.

Yurdusev, A. N. (1993). Level of analysis and Unit of Analysis: a case Distinction. *Millennium journal of International Studies*, 22(1), 77-88.

Yusuf, O. (2006). Solutions for e-Government Development in Nigeria.Accenture EIU Government Research

Zaiontz, C. (2020). *Determining the Number of Factors to Retain | Real Statistics Using Excel*.http://www.real-statistics.com/multivariate-statistics/factor-analysis/determining-number-of-factors/

Zeng, F., Jiang, Y., Chuang, L. & Shen, X. (2012). Dependability analysis of control center networks in smart grid using stochastic petri nets. *IEEE transactions on parallel and distributed systems,* 23(9), 1721-1730.

Zhang, P., Li, T., Ge, R., & Yen, D. C. (2012). A theoretical acceptance model for computer-based communication media: Nine field studies. *Computers in Human Behavior,* 28(5), 1805-1815.

Ziglio, E. (1996).The Delphi method and its contribution to decision-making. In M. Adler and E. Ziglio (Eds.), *Gazing into the oracle: The Delphi methods and its application to social policy and public health*. London: Jessica Kingsley publishers.

Zott, C., Amit, R., & Massa, L. (2012). The business model: recent developments and future research. *Journal of management*, 37(4), 1019-1042.

Zunk, B., Marchner, M., Uitz, I., Lerch, C., &Schiele, H. (2014). The Role of Electronic-procurement in the Austrian Construction Industry: Adoption Rate, Benefits and Barriers. *International journal of industrial engineering and management,* 5(1), 13-21.

APPENDIX A

Cover Letter

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SCHOOL OF ENVIRONMENTAL TECHNOLOGY

DEPARTMENT OF QUANTITY SURVEYING

VICE CHANCELLOR
Prof. Abdullahi Bala, PhD FSSSN

HEAD OF DEPARTMENT
Dr. Y. D. Mohammed, MNIQS, MNISP

Telephone:+234 803 5884 783
Telegram: FUTECH,
P.M.B. 65, Minna
E-mail:qsdepartment@futminna.edu.ng

Our Ref *Your Ref* 29th August, 2019

TO WHOM IT MAY CONCERN

I wish to introduce **ABDULLAHI, AMEENAH HAJA** with registration number PhD/SET/2017/1040 to you.

She is a post graduate student in the Department of Quantity Surveying. She is to carry out a research on **"E-PROCUREMENT IMPLEMENTATION MODEL IN THE PUBLIC CONSTRUCTION SECTOR IN ABUJA, NIGERIA".**

Please kindly assist her as may be necessary.

Thank you.

2019

Dr. Y. D. Mohammed

HOD Quantity Surveying

APPENDIX B

DELPHI QUESTIONNAIRE

ROUND ONE

SURVEY QUESTIONNAIRE
DEPARTMENT OF QUANTITY SURVEYING
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Dear Sir/Ma,

QUESTIONNAIRE ON ELECTRONIC-PROCUREMENT IMPLEMENTATION MODEL FOR PUBLIC CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

I am a PhD student of the above Department, conducting aresearch on **"electronic-procurement implementation model for public construction projects in Abuja, Nigeria".**The research is aimed at developing a model for Electronic-procurement implementation with a view to enhancing effective contract administration in the public sector using a Delphi surveymethod. Your organisation has been mentioned to be one of the best placed to provide information relevant to this research. It will be appreciated if you can spare **20 minutes** of your time to complete the attached questionnaire for the first round of the Delphi survey. Please be assured that all information given will be used for academic purposes only.An ethical consent form is included for your perusal and completion.

For further enquiries should they arise, kindly contact Ameenah Abdullahi on **08035975582**or via E-mail at **ameenahabdullahi45@gmail.com**

Thank you for your anticipated co-operation.

Yours faithfully

Abdullahi, Ameenah Haja.

ETHICAL CONSENT FORM

Title of the Research Project

Electronic-procurement implementation model for public construction projects in Abuja, Nigeria

Name of the Researcher

Abdullahi, Ameenah Haja PhD candidate,

Department of Quantity Surveying, School of Environmental Technology,

Federal University of Technology, Minna

Please respond to the following by placing a tick (√) in the box provided

1. I have read researcher Abdullahi's covering letter and I understand what kind of information she is on the lookout for. ( )
2. I agree to answer the questions modelled in this study, and to provide accurate information to the best of my knowledge. ( )
3. I understand that my participation is voluntary and that I am free to withdraw at any time without offering reasons. ( )
4. I agree to take part in this study. ( )

Name of the respondent and organisation (optional):

--

--

Phone number: --- -

Email address: --

Signature: --

Date: -- -

Note: All the information provided by you on behalf of the organisation will be treated strictly as confidential and for academic purpose only.

Questionnaire on Electronic-procurement implementation model for public construction projects in Abuja, Nigeria

Section I: Respondents Demographic information

I. Organisation: ………………………………………………

II. Position ____

III. Educational Level

(a) HND [ ] (b) B. Sc/ B.Tech [ ] (c) Master's Degree [ ] (d) PhD [ ]

IV. Years of experience

(a) 0-5 [ ] (b) 6-10 [ ] (c) 11-15 [ ] (d) 16 above [ ]

V. Professional affiliation (tick all that is applicable)

(a) Quantity surveyor [ ] (b) Architect [ ] (c) Builder [ ] (d) Engineer [ ]

(e) Procurement Officer [ ]

VI. Do you have an extensive experience in public sector construction procurement selection process?

(a) Yes [ ] (b) No [ ]

VII. Are you directly involved in the procurement process of your organisation?

(a) Yes [ ] (b) No [ ]

VII. For how long have you been involved in the procurement process of your organisation?

(a) 0-5 [ ] (b) 6-10 [ ] (c) 11-15 [ ] (d) 16 above [ ]

Section IIA: Impacts of external variables on implementation of Electronic-procurement

1. From the following factors in the Table below, kindly rate the level of impact these factors have on the implementation of Electronic-procurement in your organisation. **Kindly respond to the question using a scale of 1-5. Where 1= very low level impact, 2= Low level impact, 3=No Impact, 4=High level of impactand 5= Very high level of Impact.**

S/NO	Factors	Very low level impact	Low level impact	No Impact	High level impact	Very high level Impact
	Technology					
1	Lack of authentication of electronic-procurement Transactions.					
2	Internet Diffusion					
3	Non- availability of reliable ICT Infrastructure					
4	Security and privacy concerns of information exchange					
5	Investment in electronic devices					
6	Expensive internet services in Nigeria					
7	Low rate of internet diffusion					
8	Non availability of high speed internet					
	People					
1	Lack of trust to share information among partners					
2	Human resource hiring development					
3	Citizen expectations					
4	Lack of readiness					
5	Lack of availability of skilled personnel to handle electronic-procurement tools and processes					
6	Lack of knowledge of the benefits of electronic-procurement use.					
	Process					
1	Lack of standards					
2	Lack of laws					
3	Political challenges					
4	Electricity supply					
5	Lack of capital					
6	Fear to change into a new system					
7	Non Availability of training procedure					

Section IIB: Drivers to the implementation of Electronic-procurement

1. Kindly indicate the effects of the under listed driver factors on implementation of Electronic-procurement using the scale 1-5. **Where 1= Very low effect, 2= Low effect, 3=No effect, 4=High effect and 5= Very high effect**

2. Kindly also indicate the effect of the drivers either positive or negative by putting a (+) sign for positive and a (-) for negative

S/NO	Factors	Very low effect	Low effect	No effect	High effect	Very high effect	Positive (+)	Negative (-)
1	Availability of IT manpower in the organization							
2	Reduction in errors associated with paper-based methods							
3	Reduction in time spent on procurement process							
4	Less paper work							
5	Efficiency of collaboration amongst project team							
6	Availability of electronic-procurement packages							
7	Less labour intensive feature of electronic-procurement							
8	Decision by our clients/service providers to use electronic-procurement							
9	Perceived benefits associated with reduction in the procurement cost							
10	Benefit of competitiveness inherent in electronic-procurement							
11	Benefits of enhanced level of efficiency in job delivery							
12	Benefits of elimination of geographic barriers in							

	procurement							
13	Benefits of effective communication between project team members							
14	Compatibility of electronic-procurement with our existing procurement process							
15	Financial base of organization							
16	Size of organization							
17	Ease of use of electronic-procurement technology and tools							
18	Number of existing users amongst business partners							
19	Geographical spread of the business activities of my organization							
20	Transparent transaction process							
21	The increase in profit margin associated with e-procurement							
22	Faster problem solving due to access to real – time information							
23	Reduced staffing levels in procurement							
24	Price reduction in tendering							
25	Gaining competitive advantage							
26	Enhanced decision making and market intelligence							
27	Increased accuracy of production capacity							
28	Reduced operating and inventory costs							

Section III. Barriers and Benefits of Electronic-procurement

1. Kindly rate the significance of the following benefits of Electronic-procurement an organisation can get from the implementation of Electronic-procurement to procurement of construction works using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/NO	Factors	Very low significance	Low significance	No significance	High significance	Very high significance
Benefits to the client						
1	Elimination of intermediaries					
2	Improved and efficient negotiation					
3	Reduced exchange cost					
4	Process shortening					
5	Price reduction					
6	Time reduction					
7	Improved control and communication					
8	Effectiveness and efficiency					
9	Identifying potential sourcing opportunities					
10	Reduced inventory levels					
11	Less paper work					
12	Standardization of processes					
13	Decentralized procurement process					
14	continual usage by organizational employees					
Benefits to the contractor						
1	Improved customer satisfaction					
2	Improved relationship with other firms					
3	It has an impact on service quality					
4	Work process mechanization					
5	Better transparency and checking					
6	Improved leverage on spending					
7	Reduced influence of bureaucracy					
8	Impact on process capability, productivity and dependability					
9	Immediate availability of information					
10	Minimum duplication					
11	Enable organizations to locate products and new sources of supply					

	that can provide products and services at lower prices					
12	Returning to investment					
13	It improves communication between buyer and suppliers					
14	provides wider base of buyers and suppliers,					
Benefits to the public						
1	It has an impact on cost efficiency, customer service					
2	higher organizational performance					
3	Quality outcome					
4	user satisfaction					
5	cost-effective technology which improves public trust					
6	Supply chain integration.					
7	streamlining the ordering process to obtain significant efficiencies					
8	Improvement in internal service quality					
9	Clear and achievable implementation phase					
10	Clear accountability for buying in organizational structure					

2. From the following factors, kindly indicate how significantly the following items constitute barriers to Electronic-procurement implementation in your organisation using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/No	**Factors**	**Very low significance**	**Low significance**	**No significance**	**High significance**	**Very high significance**
1	Lack of technical knowledge and skills					
2	Lack of financial resources (capital)					
3	Resistance to change					
4	Security in the process - Data transmission to the wrong person					

5	High investment cost					
6	Lack of laws on Electronic-procurement					
7	Investment in electronic devices					
8	Investment in human resource development					
9	Lack of evidence of the benefits of electronic-procurement in the building industry					
10	It not being the top initiative or priority of the company					
11	Lack of interoperability and standards with traditional communication systems					
12	Lack of top management support and commitment					
13	Lack of motivation of people					
14	Resistance to new technology					
15	Complicated procedures and extended Relationships					
16	Partial Data Display - incomplete documents provided					
17	Clarity of sender and tenderer information					
18	Enforceability of electronic contracts					
19	Information technology investment costs					
20	Confidentiality of information – unauthorised viewing					
21	Prevention of tampering with documents -changes to documents					
22	Lack of Flexibility					
23	Lack of business relationship with companies providing electronic-procurement					
24	Slow Internet network connectivity					
25	Expensive internet services in Nigeria					
26	Low rate of internet diffusion					
27	No business benefit realised					

Section IV. Operational Requirements

1. How important do you think these operational requirements are for electronic-procurement implementation in your organisation? **Please use the scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/NO	Factors	Not important	Less important	Important	Very Important	Very much Important
1	Technological availability					
2	Availability of trained personnel					
3	Infrastructural availability					
4	Organisational willingness					
5	High level of ICT knowledge and skills					
6	Provision of Security, privacy and trust concerns					
7	Financial capability					
8	Organisational size					
9	Good knowledge of electronic-procurement					
10	Availability of training procedure					
11	Employee competence					
12	Management commitment on implementation of electronic-procurement					
13	Appropriate implementation framework					
14	Supplier identification					
15	Supplier assessment					
16	Development and review of procurement strategy					
17	Availability of affordable Internet service in Nigeria					
18	Availability of high speed internet					
19	High rate of					

	internet diffusion					
20	High level of awareness of electronic-procurement					
21	Availability of organisation website					

5. Kindly rate how important the potential values that will be derived from effective implementation of Electronic-procurement in your organisation. **Using a scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/No	Factors	Not important	Less important	Important	Very Important	Very much Important
1	Elimination of paperwork					
2	Time reduction					
3	Price reduction					
4	Transparency					
5	Corruption elimination					
6	Bureaucracy elimination					
7	Standardization of process					
8	Process shortening					
9	The efficiency of procurement process					
10	Exposure to new technologies					
11	closer and more effective relationship between partners					
12	strengthening the trading relationship between different partners					
13	Improving product and service quality					
14	Fast and efficient procurement process.					
15	Reduction in redundant cost					
16	Organizational competitiveness					
17	Giving rise to innovative ideas					
18	Faster arrival of products from the supplier.					
19	improving the speed					

	of service					
20	quality, reliability and trust					
21	Accountability					
22	Central coordination and aggregation of demand					
23	User satisfaction					
24	Improvement in internal service quality					

DELPHI ROUND TWO QUESTIONNAIRE
SURVEY QUESTIONNAIRE
DEPARTMENT OF QUANTITY SURVEYING
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Dear Sir/Ma,

QUESTIONNAIRE ON ELECTRONIC-PROCUREMENT IMPLEMENTATION MODEL FOR PUBLIC CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

Thank you for taking part in the first round of the Delphi Survey on **"electronic-procurement implementation model for public construction projects in Abuja, Nigeria".** Your effort and time is highly appreciated. The research is aimed at developing a model for Electronic-procurement implementation with a view to enhancing effective contract administration in the public sector using a Delphi survey method.. Your organisation has been mentioned to be one of the best placed to provide information relevant to this research. It will be appreciated if you can spare **20 minutes** of your time to carefully go through and complete the attached questionnaire for the second round of the Delphi survey. The purpose of **Round 2** is to provide you with the opportunity to review your response, if desired. Your response will form the basis upon which this research will be grounded; it will be appreciated if you take your time. Please be assured that all information given will be used for academic purposes only.

For further enquiries should they arise, kindly contact Ameenah Abdullahi on **08035975582**or via E-mail at **ameenahabdullahi45@gmail.com**

Thank you for your anticipated co-operation.

Yours faithfully

Abdullahi, Ameenah Haja.

Section IA: Impacts of External variables on implementation of Electronic-procurement implementation

1. From the following factors in the Table below, kindly rate the level of impact these factors have on the implementation of Electronic-procurement in your organisation. **Kindly respond to the question using a scale of 1-5. Where 1= very low level of impediment, 2= Low level of impediment, 3=No Impediment, 4=High level of impedimentand 5= Very high level of Impediment**

S/NO	Factors	Very low level impact	Low level impact	No Impact	High level impact	Very high level Impact
	Technology					
1	Lack of authentication of electronic-procurement Transactions.					
2	Non- availability of reliable ICT Infrastructure					
3	Security and privacy concerns of information exchange					
4	Expensive internet services in Nigeria					
5	Low rate of internet diffusion					
6	Non availability of high speed internet					
	People					
1	Human resource hiring development					
2	Lack of availability of skilled personnel to handle electronic-procurement tools and processes					
	Process					
1	Lack of standards					
2	Lack of laws					
3	Political challenges					
4	Electricity supply					
5	Lack of capital					
6	Fear to change into a new system					
7	Non Availability of training procedure					

Section IB: Drivers to the implementation of Electronic-procurement

1. Kindly indicate the effects of the under listed driver factors on implementation of Electronic-procurement using the scale 1-5. **Where 1= Very low effect, 2= Low effect, 3=No effect, 4=High effect and 5= Very high effect**

S/NO	Factors	Very low effect	Low effect	No effect	High effect	Very high effect
1	Availability of IT manpower in the organization					
2	Reduction in errors associated with					

	paper-based methods					
3	Reduction in time spent on procurement process					
4	Less paper work					
5	Efficiency of collaboration amongst project team					
6	Availability of electronic-procurement packages					
7	Less labour intensive feature of electronic-procurement					
8	Decision by our clients/service providers to use electronic-procurement					
9	Perceived benefits associated with reduction in the procurement cost					
10	Benefit of competitiveness inherent in electronic-procurement					
11	Benefits of enhanced level of efficiency in job delivery					
12	Benefits of elimination of geographic barriers in procurement					
13	Benefits of effective communication between project team members					
14	Compatibility of electronic-procurement with our existing procurement process					
15	Financial base of organization					
16	Ease of use of electronic-procurement technology and tools					
17	Number of existing users amongst business partners					
18	Geographical spread of the business activities of my organization					
19	Transparent transaction process					
20	Faster problem solving due to access to real –time information					
21	Reduced staffing levels in procurement					
22	Price reduction in tendering					
23	Enhanced decision making and market intelligence					
24	Increased accuracy of production capacity					
25	Reduced operating and inventory costs					

Section II. Barriers and Benefits of Electronic-procurement

1. Kindly rate the significance of the following benefits of Electronic-procurement an organisation can get from the implementation of Electronic-procurement to procurement of construction works using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/NO	Factors	Very low significance	Low significance	No significance	High significance	Very high significance
Benefits to the client						
1	Elimination of intermediaries					

2	Improved and efficient negotiation					
3	Reduced exchange cost					
4	Process shortening					
5	Price reduction					
6	Time reduction					
7	Improved control and communication					
8	Effectiveness and efficiency					
9	Identifying potential sourcing opportunities					
10	Reduced inventory levels					
11	Less paper work					
12	Standardization of processes					
13	Decentralized procurement process					
14	continual usage by organizational employees					
Benefits to the contractor						
1	Improved customer satisfaction					
2	Improved relationship with other firms					
3	It has an impact on service quality					
4	Work process mechanization					
5	Better transparency and checking					
6	Improved leverage on spending					
7	Reduced influence of bureaucracy					
8	Impact on process capability, productivity and dependability					
9	Immediate availability of information					
10	Minimum duplication					
11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices					
12	Returning to investment					
13	It improves communication between buyer and suppliers					

14	provides wider base of buyers and suppliers,					
Benefits to the public						
1	It has an impact on cost efficiency, customer service					
2	higher organizational performance					
3	Quality outcome					
4	user satisfaction					
5	cost-effective technology which improves public trust					
6	Supply chain integration.					
7	streamlining the ordering process to obtain significant efficiencies					
8	Improvement in internal service quality					
9	Clear and achievable implementation phase					
10	Clear accountability for buying in organizational structure					

2. From the following factors, kindly indicatehow significantly the following items constitute barriers to Electronic-procurement implementation in your organisation using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/No	Factors	Very low significance	Low significance	No significance	High significance	Very high significance
1	Lack of technical knowledge and skills					
2	Lack of financial resources (capital)					
3	Resistance to change					
4	Security in the process - Data transmission to the wrong person					
5	High investment cost					
6	Lack of laws on Electronic-procurement					
7	Investment in electronic devices					
8	Investment in human resource development					
9	Lack of evidence of the benefits of electronic-procurement in the					

	building industry					
10	It not being the top initiative or priority of the company					
11	Lack of interoperability and standards with traditional communication systems					
12	Lack of top management support and commitment					
13	Lack of motivation of people					
14	Resistance to new technology					
15	Complicated procedures and extended Relationships					
16	Partial Data Display - incomplete documents provided					
17	Clarity of sender and tenderer information					
18	Enforceability of electronic contracts					
19	Information technology investment costs					
20	Confidentiality of information – unauthorised viewing					
21	Prevention of tampering with documents -changes to documents					
22	Lack of Flexibility					
23	Lack of business relationship with companies providing electronic-procurement					
24	Slow Internet network connectivity					
25	Expensive internet services in Nigeria					
26	Low rate of internet diffusion					
27	No business benefit realised					

Section III. Operational Requirements

1. How important do you think these operational requirements are for electronic-procurement implementation in your organisation? **Please use the scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/NO	Factors	Not important	Less important	Important	Very Important	Very much Important
1	Technological availability					
2	Availability of trained personnel					
3	Infrastructural availability					
4	Organisational willingness					
5	High level of ICT knowledge and skills					
6	Provision of Security, privacy and trust concerns					
7	Financial capability					
8	Good knowledge of electronic-procurement					
9	Availability of training procedure					
10	Employee competence					
11	Management commitment on implementation of electronic-procurement					
12	Appropriate implementation framework					
13	Supplier identification					
14	Supplier assessment					
15	Development and review of procurement strategy					
16	Availability of affordable Internet service in Nigeria					
17	Availability of high speed internet					
18	High rate of internet diffusion					
19	High level of awareness of electronic-procurement					
20	Availability of organisation website					

5. Kindly rate how important the potential values that will be derived from effective implementation of Electronic-procurementin your organisation. **Using a scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/No	Factors	Not important	Less important	Important	Very Important	Very much Important
1	Elimination of paperwork					
2	Time reduction					
3	Price reduction					
4	Transparency					
5	Corruption elimination					
6	Bureaucracy elimination					
7	Standardization of process					
8	Process shortening					
9	The efficiency of procurement process					
10	Exposure to new technologies					
11	closer and more effective relationship between partners					
12	strengthening the trading relationship between different partners					
13	Improving product and service quality					
14	Fast and efficient procurement process.					
15	Reduction in redundant cost					
16	Organizational competitiveness					
17	Giving rise to innovative ideas					
18	Faster arrival of products from the supplier.					
19	improving the speed of service					
20	quality, reliability and trust					
21	Accountability					
22	Central coordination and aggregation of demand					
23	User satisfaction					

24	Improvement in internal service quality					

DELPHI ROUND THREE QUESTIONNAIRE

SURVEY QUESTIONNAIRE
DEPARTMENT OF QUANTITY SURVEYING
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Dear Sir/Ma,

QUESTIONNAIRE ON ELECTRONIC-PROCUREMENT IMPLEMENTATION MODEL FOR PUBLIC CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

Thank you for taking part in the first and second rounds of the Delphi Survey on **"electronic-procurement implementation model for public construction projects in Abuja, Nigeria".** Your effort and time amidst your tight schedule is highly appreciated. The research is aimed at developing a model for Electronic-procurement implementation with a view to enhancing effective contract administration in the public sector using a Delphi survey method.It will be appreciated if you can spare **10 minutes** of your time to carefully go through the analysis of the second round of the Delphi survey and review your responses where necessary. The purpose of Round 2 is to provide you with another opportunity to review your responses, if desired by presenting to you the analysis from the previous round. Your response will form the basis upon which this research will be grounded; it will be appreciated if you take your time. Please be assured that all information given will be used for academic purposes only.

For further enquiries should they arise, kindly contact Ameenah Abdullahi on **08035975582**or via E-mail at **ameenahabdullahi45@gmail.com**

Thank you for your anticipated co-operation.

Yours faithfully

Abdullahi, Ameenah Haja.

***Note: the mean rating of all experts responses have been provided below. A column for review has also been provided for you to review the responses from the previous round if need be.**

Section IA: Impacts of external variables onElectronic-procurementthe implementation

1. From the following factors in the Table below, kindly rate the level of impact these factors have on the implementation of Electronic-procurement in your organisation. **Kindly respond to the question using a scale of 1-5. Where 1= very low level of impediment, 2= Low level of impediment, 3=No Impediment, 4=High level of impedimentand 5= Very high level of Impediment**

S/NO	Factors	Mean ratings of Experts responses	Review
	Technology		
1	Lack of authentication of electronic-procurement	2.42	
2	Internet Diffusion	2.67	
3	Non- availability of reliable ICT Infrastructure	4.00	
4	Security and privacy concerns of information exchange	2.92	
5	Investment in electronic devices	3.67	
6	Expensive internet services in Nigeria	4.33	
7	Low rate of internet diffusion	4.00	
8	Non availability of high speed internet	4.50	
	People		
1	Lack of trust to share information among partners	3.83	
2	Human resource hiring development	3.08	
3	Lack of availability of skilled personnel to handle electronic-procurement tools and processes	3.58	
4	Lack of knowledge of the benefits of electronic-procurement use.	3.67	
	Process		
1	Lack of standards	3.17	
2	Lack of laws	3.67	
3	Political challenges	4.17	
4	Electricity supply	4.42	
5	Lack of capital	3.08	
6	Fear to change into a new system	4.08	
7	Non Availability of training procedure	4.42	

Section IB: Drivers to the implementation of Electronic-procurement

1. Kindly indicate the effects of the under listed driver factors on implementation of Electronic-procurement using the scale 1-5. **Where 1= Very low effect, 2= Low effect, 3=No effect, 4=High effect and 5= Very high effect**

S/NO	Factors	Mean Ratings of Experts responses	Review
1	Availability of IT manpower in the organization	4.42	
2	Reduction in errors associated with paper-based methods	3.33	
3	Reduction in time spent on procurement process	3.25	
4	Less paper work	3.75	
5	Efficiency of collaboration amongst project team	3.17	
6	Availability of electronic-procurement packages	3.67	
7	Less labour intensive feature of electronic-procurement	3.75	
8	Decision by our clients/service providers to use electronic-procurement	2.83	
9	Perceived benefits associated with reduction in the procurement cost	3.83	
10	Benefit of competitiveness inherent in electronic-procurement	2.50	
11	Benefits of enhanced level of efficiency in job delivery	3.75	
12	Benefits of elimination of geographic barriers in procurement	3.83	
13	Benefits of effective communication between project team members	3.67	
14	Compatibility of electronic-procurement with our existing procurement process	3.67	
15	Financial base of organization	3.33	
16	Size of organization	2.75	
17	Ease of use of electronic-procurement technology and tools	3.50	
18	Number of existing users amongst business partners	3.08	
19	Geographical spread of the business activities of my organization	3.75	
20	Transparent transaction process	4.25	
21	The increase in profit margin associated with e- procurement	3.17	
22	Faster problem solving due to access to real –time information	3.92	
23	Reduced staffing levels in procurement	3.08	
24	Price reduction in tendering	3.58	
25	Gaining competitive advantage	3.58	
26	Enhanced decision making and market intelligence	3.33	

27	Increased accuracy of production capacity	4.00	
28	Reduced operating and inventory costs	3.58	

Section II. Barriers and Benefits of Electronic-procurement

1. Kindly rate the significance of the following benefits of Electronic-procurement an organisation can get from the implementation of Electronic-procurement to procurement of construction works using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/NO	Factors	Mean ratings of Experts responses	Review
Benefits to the client			
1	Elimination of intermediaries	3.75	
2	Improved and efficient negotiation	2.42	
3	Reduced exchange cost	3.17	
4	Process shortening	4.00	
5	Price reduction	3.67	
6	Time reduction	4.00	
7	Improved control and communication	4.08	
8	Effectiveness and efficiency	4.00	
9	Identifying potential sourcing opportunities	3.75	
10	Reduced inventory levels	3.50	
11	Less paper work	4.33	
12	Standardization of processes	4.33	
13	Decentralized procurement process	3.50	
14	continual usage by organizational employees	3.67	
Benefits to the contractor			
1	Improved customer satisfaction	4.42	
2	Improved relationship with other firms	3.50	
3	It has an impact on service quality	3.92	
4	Work process mechanization	4.42	
5	Better transparency and checking	4.33	
6	Improved leverage on spending	4.00	
7	Reduced influence of bureaucracy	4.33	
8	Impact on process capability, productivity and dependability	3.92	
9	Immediate availability of information	4.00	
10	Minimum duplication	4.08	
11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices	4.17	
12	Return on investment	3.92	
13	It improves communication between buyer and suppliers	4.08	
14	provides wider base of buyers and suppliers,	4.08	
Benefits to the public			
1	It has an impact on cost efficiency, customer service	4.25	
2	higher organizational performance	4.67	
3	Quality outcome	4.42	

4	user satisfaction	4.50	
5	cost-effective technology which improves public trust	4.17	
6	Supply chain integration.	3.33	
7	streamlining the ordering process to obtain significant efficiencies	3.67	
8	Improvement in internal service quality	3.58	
9	Clear and achievable implementation phase	3.75	
10	Clear accountability for buying in organizational structure	4.25	

2. From the following factors, kindlyindicate how significantly the following items constitute the barriers to Electronic-procurement implementation in your organisation using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/No	Factors	Mean ratings of Experts responses	Review
1	Lack of technical knowledge and skills	3.50	
2	Lack of financial resources (capital)	1.50	
3	Resistance to change	3.83	
4	Security in the process - Data transmission to the wrong person	2.08	
5	High investment cost	2.08	
6	Lack of laws on Electronic-procurement	4.00	
7	Investment in electronic devices	4.08	
8	Investment in human resource development	3.33	
9	Lack of evidence of the benefits of electronic-procurement in the building industry	3.75	
10	It not being the top initiative or priority of the company	1.92	
11	Lack of interoperability and standards with traditional communication systems	1.25	
12	Lack of top management support and commitment	3.83	
13	Lack of motivation of people	4.00	
14	Resistance to new technology	3.83	
15	Complicated procedures and extended Relationships	1.08	
16	Partial Data Display - incomplete documents provided	1.50	
17	Clarity of sender and tenderer information	1.08	
18	Enforceability of electronic contracts	3.75	
19	Information technology investment costs	3.92	
20	Confidentiality of information – unauthorised viewing	2.08	
21	Prevention of tampering with documents -changes to documents	2.08	
22	Lack of Flexibility	3.83	
23	Lack of business relationship with companies providing electronic-procurement	1.50	
24	Slow Internet network connectivity	3.67	
25	Expensive internet services in Nigeria	3.67	
26	Low rate of internet diffusion	4.25	
27	No business benefit realised	1.50	

Section III. Operational Requirements

1. How important do you think these operational requirements are for electronic-procurement implementation in your organisation? **Please use the scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/NO	Factors	Mean ratings of Experts responses	Review
1	Technological availability	4.58	
2	Availability of trained personnel	4.33	
3	Infrastructural availability	4.33	
4	Organisational willingness	4.00	
5	High level of ICT knowledge and skills	4.50	
6	Provision of Security, privacy and trust concerns	3.75	
7	Financial capability	3.67	
8	Organisational size	2.58	
9	Good knowledge of electronic-procurement	4.17	
10	Availability of training procedure	4.25	
11	Employee competence	4.00	
12	Management commitment on implementation of electronic-procurement	4.08	
13	Appropriate implementation framework	4.25	
14	Supplier identification	3.08	
15	Supplier assessment	2.92	
16	Development and review of procurement strategy	3.58	
17	Availability of affordable Internet service in Nigeria	4.33	
18	Availability of high speed internet	4.33	
19	High rate of internet diffusion	4.00	
20	High level of awareness of electronic-procurement	3.83	
21	Availability of organisation website	3.92	

5. Kindly rate how important the potential values that will be derived from effective implementation ofElectronic-procurementin your organisation. **Using a scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/No	Factors	Mean ratings of Experts responses	Review
1	Elimination of paperwork	4.67	
2	Time reduction	4.17	
3	Price reduction	4.08	
4	Transparency	4.58	
5	Corruption elimination	4.00	
6	Bureaucracy elimination	4.50	
7	Standardization of process	4.42	
8	Process shortening	3.58	
9	The efficiency of procurement process	4.25	
10	Exposure to new technologies	4.17	
11	closer and more effective relationship between partners	3.17	
12	strengthening the trading relationship between different partners	3.08	

13	Improving product and service quality	4.25	
14	Fast and efficient procurement process.	3.75	
15	Reduction in redundant cost	3.00	
16	Organizational competitiveness	3.33	
17	Giving rise to innovative ideas	3.83	
18	Faster arrival of products from the supplier.	3.92	
19	improving the speed of service	3.92	
20	quality, reliability and trust	4.08	
21	Accountability	4.42	
22	Central coordination and aggregation of demand	3.92	
23	User satisfaction	3.42	
24	Improvement in internal service quality	4.25	

FINAL SURVEY QUESTIONNAIRE

SURVEY QUESTIONNAIRE
DEPARTMENT OF QUANTITY SURVEYING
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Dear Sir/Ma,

QUESTIONNAIRE ON ELECTRONIC-PROCUREMENT IMPLEMENTATION MODEL FOR PUBLIC CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

Thank you for taking part in the first and second rounds of the Delphi Survey on **"electronic-procurement implementation model for public construction projects in Abuja, Nigeria".** Your effort and time amidst your tight schedule is highly appreciated. The research is aimed at developing a model for Electronic-procurement implementation with a view to enhancing effective contract administration in the public sector. It will be appreciated if you can spare **15 minutes** of your time to carefully go through and complete the attached questionnaire for the survey. Your response will form the basis upon which this research will be grounded; it will be appreciated if you take your time. Please be assured that all information given will be used for academic purposes only.

For further enquiries should they arise, kindly contact Ameenah Abdullahi on **08035975582**or via E-mail at **ameenahabdullahi45@gmail.com**

Thank you for your anticipated co-operation.

Yours faithfully

Abdullahi, Ameenah Haja.

Questionnaire on Electronic-procurement implementation model for public construction projects in Abuja, Nigeria

Section I: Respondents Demographic information

I. Organisation: ………………………………………………

II. Position ____

III. Educational Level

(a) HND [ ] (b) B. Sc/ B.Tech [ ] (c) Master's Degree [ ] (d) PhD [ ]

IV. Years of experience

(a) 0-5 [ ] (b) 6-10 [ ] (c) 11-15 [ ] (d) 16 above [ ]

V. Professional affiliation (tick all that is applicable)

(a) Quantity surveyor [ ] (b) Architect [ ] (c) Builder [ ] (d) Engineer [ ]

(e) Procurement Officer [ ]

VI. Do you have an extensive experience in public sector construction procurement selection process?

(a) Yes [ ] (b) No [ ]

VII. Are you directly involved in the procurement process of your organisation?

(a) Yes [ ] (b) No [ ]

VII. For how long have you been involved in the procurement process of your organisation?

(a) 0-5 [ ] (b) 6-10 [ ] (c) 11-15 [ ] (d) 16 above [ ]

Section IIA: Impacts of external variables onElectronic-procurementimplementation

1. From the following factors in the Table below, kindly rate the level of impact these factors have on the implementation of Electronic-procurement in your organisation. **Kindly respond to the question using a scale of 1-5. Where 1= very low level of impediment, 2= Low level of impediment, 3=No Impediment, 4=High level of impedimentand 5= Very high level of Impediment**

S/NO	Factors	Very low level of impediment	Low level of impediment	No Impediment	High level of impediment	Very high level of Impediment
	Technology					
1	Non-availability of reliable ICT Infrastructure					
2	Expensive internet services in Nigeria					
3	Low rate of internet diffusion					
4	Non availability of high speed internet					
	People					
1	Human resource hiring development					
2	Lack of availability of skilled personnel to handle electronic-procurement tools and processes					
	Process					
1	Lack of standards					
2	Lack of laws					
3	Political challenges					
4	Electricity supply					
5	Lack of capital					
6	Fear to change into a new system					
7	Non Availability of training procedure					

Section IIB: Drivers to the implementation of Electronic-procurement

1. Kindly indicate the effects of the under listed driver factors on implementation of Electronic-procurement using the scale 1-5. **Where 1= Very low effect, 2= Low effect, 3=No effect, 4=High effect and 5= Very high effect**

S/NO	Factors	Very low effect	Low effect	No effect	High effect	Very high effect
1	Availability of IT manpower in the organization					
2	Reduction in errors associated with paper-based methods					
3	Reduction in time spent on procurement process					
4	Less paper work					
5	Efficiency of collaboration amongst project team					
6	Availability of electronic-procurement packages					
7	Less labour intensive feature of electronic-procurement					
8	Perceived benefits associated with reduction in the procurement cost					
9	Benefits of enhanced level of efficiency in job delivery					
10	Benefits of elimination of geographic barriers in procurement					
11	Benefits of effective communication between project team members					
12	Compatibility of electronic-procurement with our existing procurement process					
13	Financial base of organization					
14	Ease of use of electronic-procurement technology and tools					
15	Number of existing users amongst business partners					
16	Geographical spread of the business activities of my organization					
17	Transparent transaction process					
18	Faster problem solving due to access to real –time information					
19	Reduced staffing levels in procurement					
20	Price reduction in tendering					
21	Enhanced decision making and market intelligence					
22	Increased accuracy of production capacity					
23	Reduced operating and inventory costs					

Section III. Barriers and Benefits of Electronic-procurement

1. Kindly rate the significance of the following benefits of Electronic-procurement an organisation can get from the implementation of Electronic-procurement to procurement of construction works using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/NO	Factors	Very low significance	Low significance	No significance	High significance	Very high significance
Benefits to the client						
1	Elimination of intermediaries					
2	Reduced exchange cost					
3	Process shortening					
4	Price reduction					
5	Time reduction					
6	Improved control and communication					
7	Effectiveness and efficiency					
8	Identifying potential sourcing opportunities					
9	Reduced inventory levels					
10	Less paper work					
11	Standardization of processes					
12	Decentralized procurement process					
13	continual usage by organizational employees					
Benefits to the contractor						
1	Improved customer satisfaction					
2	Improved relationship with other firms					
3	It has an impact on service quality					
4	Work process mechanization					
5	Better transparency and checking					
6	Improved leverage on spending					
7	Reduced influence of bureaucracy					
8	Impact on process capability, productivity and dependability					
9	Immediate availability of information					
10	Minimum duplication					
11	Enable organizations to locate products and new sources of supply that can provide products and services at lower prices					
12	Returning to					

	investment					
13	It improves communication between buyer and suppliers					
14	provides wider base of buyers and suppliers,					
Benefits to the public						
1	It has an impact on cost efficiency, customer service					
2	higher organizational performance					
3	Quality outcome					
4	user satisfaction					
5	cost-effective technology which improves public trust					
6	Supply chain integration.					
7	streamlining the ordering process to obtain significant efficiencies					
8	Improvement in internal service quality					
9	Clear and achievable implementation phase					
10	Clear accountability for buying in organizational structure					

2. From the following factors, kindlyindicate how significantly the following items constitute the barriers to Electronic-procurement implementation in your organisation using a scale of 1-5 **Where 1= Very low significance, 2= Low significance, 3= No significance, 4=High significanceand 5= Very high Significance**

S/No	**Factors**	**Very low significance**	**Low significance**	**No significance**	**High significance**	**Very high significance**
1	Lack of technical knowledge and skills					
2	Resistance to change					
3	Lack of laws on Electronic-procurement					
4	Investment in electronic devices					
5	Investment in human resource development					
6	Lack of evidence of the benefits of electronic-procurement in the building industry					

7	Lack of top management support and commitment					
8	Lack of motivation of people					
9	Resistance to new technology					
10	Enforceability of electronic contracts					
11	Information technology investment costs					
12	Lack of Flexibility					
13	Slow Internet network connectivity					
14	Expensive internet services in Nigeria					
15	Low rate of internet diffusion					

Section IV. Operational Requirements

1. How important do you think these operational requirements are for electronic-procurement implementation in your organisation? **Please use the scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/NO	Factors	Not important	Less important	Important	Very Important	Very much Important
1	Technological availability					
2	Availability of trained personnel					
3	Infrastructural availability					
4	Organisational willingness					
5	High level of ICT knowledge and skills					
6	Provision of Security, privacy and trust concerns					
7	Financial capability					
8	Good knowledge of electronic-procurement					
9	Availability of training procedure					
10	Employee competence					
11	Management commitment on implementation of electronic-procurement					

12	Appropriate implementation framework					
13	Supplier identification					
14	Development and review of procurement strategy					
15	Availability of affordable Internet service in Nigeria					
16	Availability of high speed internet					
17	High rate of internet diffusion					
18	High level of awareness of electronic-procurement					
19	Availability of organisation website					

5. Kindly rate how important the potential values that will be derived from effective implementation of Electronic-procurement in your organisation. **Using a scale of 1-5 where 1=Not important, 2=Less important, 3=Important, 4=Very Important and 5=Very much Important**

S/No	**Factors**	**Not important**	**Less important**	**Important**	**Very Important**	**Very much Important**
1	Elimination of paperwork					
2	Time reduction					
3	Price reduction					
4	Transparency					
5	Corruption elimination					
6	Bureaucracy elimination					
7	Standardization of process					
8	Process shortening					
9	The efficiency of procurement process					
10	Exposure to new technologies					
11	closer and more effective relationship between partners					
12	strengthening the trading relationship between different partners					
13	Improving product					

	and service quality					
14	Fast and efficient procurement process.					
15	Reduction in redundant cost					
16	Organizational competitiveness					
17	Giving rise to innovative ideas					
18	Faster arrival of products from the supplier.					
19	improving the speed of service					
20	quality, reliability and trust					
21	Accountability					
22	Central coordination and aggregation of demand					
23	User satisfaction					
24	Improvement in internal service quality					

APPENDIX C

REGRESSION RESULTS

1 External Variables and Benefits

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.434[a]	.189	.172	7.729	.189	11.007	3	142	.000

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BCL

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1972.413	3	657.471	11.007	.000[b]
	Residual	8481.916	142	59.732		
	Total	10454.329	145			

a. Dependent Variable: BCL

b. Predictors: (Constant), PRO, PPL, TCH

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	32.554	3.187		10.214	.000	26.254	38.855					
	TCH	.293	.199	.134	1.473	.143	-.100	.687	.324	.123	.111	.691	1.447
	PPL	.872	.378	.191	2.308	.022	.125	1.619	.317	.190	.174	.834	1.199
	PRO	.340	.130	.233	2.620	.010	.083	.597	.363	.215	.198	.722	1.386

a. Dependent Variable: BCL

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.505[a]	.255	.239	8.336	.255	16.192	3	142	.000

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BCO

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3375.367	3	1125.122	16.192	.000[b]
	Residual	9867.242	142	69.488		
	Total	13242.610	145			

a. Dependent Variable: BCO

b. Predictors: (Constant), PRO, PPL, TCH

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	32.376	3.438		9.418	.000	25.580	39.171					
	TCH	.054	.215	.022	.251	.802	-.371	.478	.295	.021	.018	.691	1.447
	PPL	.974	.407	.190	2.392	.018	.169	1.780	.327	.197	.173	.834	1.199
	PRO	.652	.140	.397	4.656	.000	.375	.929	.470	.364	.337	.722	1.386

a. Dependent Variable: BCO

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.500[a]	.250	.234	6.196	.250	15.802	3	142	.000

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BPU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1819.857	3	606.619	15.802	.000[b]
	Residual	5451.164	142	38.388		
	Total	7271.021	145			

a. Dependent Variable: BPU

b. Predictors: (Constant), PRO, PPL, TCH

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF

1 (Constant)	25.162	2.555		9.848	.000	20.112	30.213					
TCH	-.299	.160	-.164	-1.873	.063	-.614	.017	.154	-.155	-.136	.691	1.447
PPL	1.065	.303	.280	3.516	.001	.466	1.663	.353	.283	.255	.834	1.199
PRO	.507	.104	.417	4.871	.000	.301	.713	.424	.378	.354	.722	1.386

a. Dependent Variable: BPU

2 External Variables and Barriers

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.105[a]	.011	-.010	2.278	.011	.528	3	142	.664

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BAR.1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.224	3	2.741	.528	.664[b]
	Residual	736.933	142	5.190		
	Total	745.158	145			

a. Dependent Variable: BAR.1

b. Predictors: (Constant), PRO, PPL, TCH

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	15.506	.939		16.506	.000	13.649	17.363					
TCH	.016	.059	.027	.270	.787	-.100	.132	.013	.023	.023	.691	1.447
PPL	-.133	.111	-.109	-1.197	.233	-.353	.087	-.082	-.100	-.100	.834	1.199
PRO	.021	.038	.054	.549	.584	-.055	.097	.032	.046	.046	.722	1.386

a. Dependent Variable: BAR.1

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.090[a]	.008	-.013	3.249	.008	.386	3	142	.763

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BAR.2

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.236	3	4.079	.386	.763[b]
	Residual	1499.325	142	10.559		
	Total	1511.562	145			

a. Dependent Variable: BAR.2

b. Predictors: (Constant), PRO, PPL, TCH

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	11.614	1.340		8.667	.000	8.965	14.263					
	TCH	.010	.084	.012	.116	.908	-.156	.175	-.011	.010	.010	.691	1.447
	PPL	-.169	.159	-.097	-1.063	.289	-.483	.145	-.084	-.089	-.089	.834	1.199
	PRO	.015	.055	.027	.275	.784	-.093	.123	.001	.023	.023	.722	1.386

a. Dependent Variable: BAR.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.110[a]	.012	-.009	2.970	.012	.584	3	142	.626

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: BAR.3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	10.543	1.225		8.608	.000	8.121	12.964					
	TCH	.051	.077	.066	.662	.509	-.101	.202	.049	.055	.055	.691	1.447
	PPL	-.168	.145	-.106	-1.159	.248	-.455	.119	-.067	-.097	-.097	.834	1.199
	PRO	.022	.050	.044	.448	.655	-.076	.121	.043	.038	.037	.722	1.386

a. Dependent Variable: BAR.3

3 Barriers and Drivers

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.154[a]	.024	.003	5.287	.024	1.157	3	142	.329

a. Predictors: (Constant), BAR.3, BAR.1, BAR.2

b. Dependent Variable: DRI.1

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF

1 (Constant)	18.816	3.275		5.746	.000	12.342	25.290					
BAR.1	.015	.219	.006	.067	.947	-.418	.448	.040	.006	.006	.782	1.278
BAR.2	.057	.169	.035	.335	.738	-.278	.391	.096	.028	.028	.646	1.548
BAR.3	.241	.165	.135	1.458	.147	-.086	.568	.151	.121	.121	.806	1.241

a. Dependent Variable: DRI.1

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.016[a]	.000	-.021	5.340	.000	.013	3	142	.998

a. Predictors: (Constant), BAR.3, BAR.1, BAR.2

b. Dependent Variable: DRI.2

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	21.583	3.308		6.526	.000	15.045	28.122					
BAR.1	.028	.221	.012	.129	.898	-.409	.466	.014	.011	.011	.782	1.278
BAR.2	.011	.171	.007	.066	.948	-.327	.349	.009	.006	.006	.646	1.548
BAR.3	-.016	.167	-.009	-.097	.923	-.346	.314	-.004	-.008	-.008	.806	1.241

a. Dependent Variable: DRI.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.606[a]	.367	.358	6.803	.367	41.444	2	143	.000

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: BCL

4. Drivers and Benefits

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.606[a]	.367	.358	6.803	.367	41.444	2	143	.000

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: BCL

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	26.886	2.769		9.709	.000	21.412	32.360					
DRI.1	.833	.125	.519	6.678	.000	.586	1.079	.593	.488	.444	.732	1.366
DRI.2	.229	.125	.143	1.836	.068	-.018	.476	.412	.152	.122	.732	1.366

a. Dependent Variable: BCL

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.565[a]	.319	.309	7.942	.319	33.486	2	143	.000

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: BCO

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	30.442	3.233		9.417	.000	24.052	36.832					
	DRI.1	.868	.146	.481	5.962	.000	.580	1.156	.552	.446	.411	.732	1.366
	DRI.2	.249	.146	.138	1.709	.090	-.039	.538	.387	.141	.118	.732	1.366

a. Dependent Variable: BCO

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.511[a]	.261	.250	6.131	.261	25.208	2	143	.000

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: BPU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	22.800	2.496		9.135	.000	17.867	27.734					
	DRI.1	.442	.112	.330	3.930	.000	.220	.664	.462	.312	.283	.732	1.366
	DRI.2	.341	.113	.254	3.025	.003	.118	.563	.425	.245	.217	.732	1.366

a. Dependent Variable: BPU

5 Benefits and Operational Requirements

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change

1	.362[a]	.131	.113	1.847	.131	7.139	3	142	.000

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: OPR.1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	8.489	.998		8.509	.000	6.517	10.461					
	BCL	.060	.027	.258	2.176	.031	.005	.114	.352	.180	.170	.435	2.297
	BCO	.023	.034	.110	.667	.506	-.044	.090	.319	.056	.052	.223	4.477
	BPU	.005	.040	.018	.125	.900	-.073	.083	.276	.011	.010	.300	3.330

a. Dependent Variable: OPR.1

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.203[a]	.041	.021	2.201	.041	2.039	3	142	.111

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: OPR.2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	9.723	1.189		8.178	.000	7.373	12.073					
	BCL	.037	.033	.140	1.126	.262	-.028	.101	.186	.094	.092	.435	2.297

	BCO	-.012	.040	-.053	-.304	.762	-.092	.068	.164	-.025	-.025	.223	4.477
	BPU	.042	.047	.133	.888	.376	-.051	.135	.179	.074	.073	.300	3.330

a. Dependent Variable: OPR.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.451[a]	.203	.186	1.996	.203	12.076	3	142	.000

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: OPR.3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	5.733	1.078		5.318	.000	3.601	7.864					
	BCL	.020	.030	.077	.676	.500	-.038	.078	.370	.057	.051	.435	2.297
	BCO	.077	.037	.334	2.105	.037	.005	.150	.446	.174	.158	.223	4.477
	BPU	.021	.043	.066	.482	.630	-.064	.105	.394	.040	.036	.300	3.330

a. Dependent Variable: OPR.3

6. Benefits and Potential values

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.494[a]	.245	.229	2.051	.245	15.319	3	142	.000

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: POV.1

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	Correlations	Collinearity Statistics

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.979	1.108		4.495	.000	2.789	7.169					
	BCL	.031	.030	.115	1.036	.302	-.029	.092	.414	.087	.076	.435	2.297
	BCO	.114	.038	.467	3.025	.003	.040	.189	.487	.246	.221	.223	4.477
	BPU	-.026	.044	-.079	-.591	.555	-.113	.061	.385	-.050	-.043	.300	3.330

a. Dependent Variable: POV.1

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.495[a]	.245	.229	2.504	.245	15.333	3	142	.000

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: POV.2

1 (Constant)	8.059	1.352		5.960	.000	5.386	10.732					
BCL	.009	.037	.026	.231	.818	-.065	.082	.361	.019	.017	.435	2.297
BCO	.049	.046	.165	1.068	.287	-.042	.140	.460	.089	.078	.223	4.477
BPU	.133	.054	.330	2.478	.014	.027	.239	.484	.204	.181	.300	3.330

a. Dependent Variable: POV.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.530[a]	.280	.265	1.937	.280	18.451	3	142	.000

a. Predictors: (Constant), BPU, BCL, BCO

b. Dependent Variable: POV.3

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	3.902	1.046		3.730	.000	1.834	5.970					
BCL	.055	.029	.206	1.906	.059	-.002	.111	.461	.158	.136	.435	2.297
BCO	.028	.036	.117	.774	.440	-.043	.098	.490	.065	.055	.223	4.477
BPU	.083	.041	.262	2.014	.046	.002	.165	.491	.167	.143	.300	3.330

a. Dependent Variable: POV.3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	10.319	.770		13.402	.000	8.797	11.841					
	DRI.1	.035	.035	.095	1.012	.313	-.033	.104	.212	.084	.081	.732	1.366
	DRI.2	.084	.035	.226	2.417	.017	.015	.153	.275	.198	.194	.732	1.366

a. Dependent Variable: OPR.1

7. Drivers and Operational Requirements

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.287[a]	.082	.070	1.892	.082	6.420	2	143	.002

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: OPR.1

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.186[a]	.035	.021	2.201	.035	2.563	2	143	.081

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: OPR.2

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	10.594	.896		11.823	.000	8.823	12.365					
	DRI.1	.051	.040	.121	1.262	.209	-.029	.131	.169	.105	.104	.732	1.366
	DRI.2	.039	.040	.092	.955	.341	-.041	.119	.154	.080	.078	.732	1.366

Coefficients[a]

a. Dependent Variable: OPR.2

odel Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.326[a]	.106	.093	2.107	.106	8.474	2	143	.000

a. Predictors: (Constant), DRI.2, DRI.1

b. Dependent Variable: OPR.3

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	8.993	.858		10.485	.000	7.297	10.688					
	DRI.1	.144	.039	.344	3.720	.000	.067	.220	.324	.297	.294	.732	1.366
	DRI.2	-.016	.039	-.039	-.418	.676	-.093	.060	.139	-.035	-.033	.732	1.366

a. Dependent Variable: OPR.3

8. Operational and potential values

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.463[a]	.214	.198	2.092	.214	12.909	3	142	.000

a. Predictors: (Constant), OPR.3, OPR.2, OPR.1

b. Dependent Variable: POV.1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.896	1.420		2.744	.007	1.089	6.703					
	OPR.1	.243	.096	.204	2.518	.013	.052	.433	.337	.207	.187	.844	1.184
	OPR.2	.061	.083	.058	.732	.465	-.103	.224	.205	.061	.054	.888	1.126
	OPR.3	.340	.087	.322	3.919	.000	.169	.512	.415	.312	.292	.817	1.224

a. Dependent Variable: POV.1

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.441[a]	.194	.177	2.586	.194	11.421	3	142	.000

a. Predictors: (Constant), OPR.3, OPR.2, OPR.1

b. Dependent Variable: POV.2

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	8.467	1.755		4.824	.000	4.997	11.936					
	OPR.1	.177	.119	.122	1.488	.139	-.058	.413	.262	.124	.112	.844	1.184
	OPR.2	-.005	.102	-.004	-.044	.965	-.207	.198	.142	-.004	-.003	.888	1.126
	OPR.3	.493	.107	.382	4.589	.000	.280	.705	.426	.359	.346	.817	1.224

a. Dependent Variable: POV.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	Change Statistics F Change	Change Statistics df1	Change Statistics df2	Change Statistics Sig. F Change
1	.518[a]	.268	.253	1.953	.268	17.369	3	142	.000

a. Predictors: (Constant), OPR.3, OPR.2, OPR.1

b. Dependent Variable: POV.3

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	4.219	1.326		3.182	.002	1.598	6.840					
	OPR.1	.139	.090	.121	1.549	.124	-.038	.317	.290	.129	.111	.844	1.184
	OPR.2	-.007	.077	-.007	-.095	.925	-.160	.146	.162	-.008	-.007	.888	1.126
	OPR.3	.473	.081	.464	5.839	.000	.313	.634	.506	.440	.419	.817	1.224

a. Dependent Variable: POV.3

9. Barriers and potential values of effective implementation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.171[a]	.029	.009	2.32508	.029	1.422	3	142	.239

a. Predictors: (Constant), PPLB, INSTB, PROB
b. Dependent Variable: PROV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.067	1.440		7.684	.000
	INSTB	-.060	.096	-.058	-.624	.534
	PROB	.044	.074	.061	.592	.555
	PPLB	.112	.073	.142	1.537	.127

a. Dependent Variable: PROV

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.227[a]	.051	.031	2.81986	.051	2.568	3	142	.057

a. Predictors: (Constant), PPLB, INSTB, PROB
b. Dependent Variable: COMV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.973	1.747		9.717	.000
	INSTB	-.207	.117	-.164	-1.772	.079
	PROB	.155	.090	.175	1.718	.088
	PPLB	.096	.088	.099	1.085	.280

a. Dependent Variable: COMV

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df2	Sig. F Change

1	.159[a]	.025	.005	2.27763	.025	1.229	142	.302

a. Predictors: (Constant), PPLB, INSTB, PROB

b. Dependent Variable: STRV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.210	1.411		7.946	.000
	INSTB	-.092	.094	-.091	-.976	.331
	PROB	.102	.073	.144	1.401	.163
	PPLB	.041	.071	.053	.578	.564

a. Dependent Variable: STRV

10. External variables and potential values of effective implementation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.306[a]	.093	.074	2.247	.093	4.878	3	142	.003

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: POV.1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	9.379	.927		10.123	.000	7.548	11.211					
	TCH	-.101	.058	-.167	-1.740	.084	-.215	.014	.030	-.144	-.139	.691	1.447
	PPL	.097	.110	.077	.883	.379	-.120	.314	.121	.074	.071	.834	1.199
	PRO	.132	.038	.330	3.506	.001	.058	.207	.270	.282	.280	.722	1.386

a. Dependent Variable: POV.1

Coefficients[a]

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.241[a]	.058	.038	2.796	.058	2.920	3	142	.036

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: POV.2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	14.753	1.153		12.797	.000	12.474	17.032					
	TCH	-.138	.072	-.187	-1.911	.058	-.280	.005	-.036	-.158	-.156	.691	1.447
	PPL	.291	.137	.190	2.131	.035	.021	.561	.170	.176	.174	.834	1.199
	PRO	.076	.047	.156	1.625	.106	-.017	.169	.122	.135	.132	.722	1.386

a. Dependent Variable: POV.2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.235[a]	.055	.035	2.219	.055	2.762	3	142	.044

a. Predictors: (Constant), PRO, PPL, TCH

b. Dependent Variable: POV.3

10.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	9.204	.915		10.057	.000	7.395	11.014					
	TCH	-.032	.057	-.056	-.567	.572	-.145	.081	.090	-.047	-.046	.691	1.447
	PPL	.136	.108	.112	1.257	.211	-.078	.351	.157	.105	.103	.834	1.199
	PRO	.078	.037	.202	2.105	.037	.005	.152	.210	.174	.172	.722	1.386

a. Dependent Variable: POV.3

APPENDIX D

CORRELATION RESULTS

1. EXTERNAL VARIABLES AND BARRIERS

Correlations

		TCH	PPL	PRO	BAR.1	BAR.2	BAR.3
TCH	Pearson Correlation	1	.378**	.508**	.013	-.011	.049
	Sig. (1-tailed)		.000	.000	.437	.446	.279
	N	146	146	146	146	146	146
PPL	Pearson Correlation	.378**	1	.324**	-.082	-.084	-.067
	Sig. (1-tailed)	.000		.000	.163	.156	.213
	N	146	146	146	146	146	146
PRO	Pearson Correlation	.508**	.324**	1	.032	.001	.043
	Sig. (1-tailed)	.000	.000		.350	.493	.301
	N	146	146	146	146	146	146
BAR.1	Pearson Correlation	.013	-.082	.032	1	.461**	.132
	Sig. (1-tailed)	.437	.163	.350		.000	.056
	N	146	146	146	146	146	146
BAR.2	Pearson Correlation	-.011	-.084	.001	.461**	1	.434**
	Sig. (1-tailed)	.446	.156	.493	.000		.000
	N	146	146	146	146	146	146
BAR.3	Pearson Correlation	.049	-.067	.043	.132	.434**	1
	Sig. (1-tailed)	.279	.213	.301	.056	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

2. EXTERRNAL VARIABLES AND DRIVERS

Correlations

		TCH	PPL	PRO	DRI.1	DRI.2
TCH	Pearson Correlation	1	.378**	.508**	.339**	.210*
	Sig. (2-tailed)		.000	.000	.000	.011
	N	146	146	146	146	146
PPL	Pearson Correlation	.378**	1	.324**	.314**	.276**
	Sig. (2-tailed)	.000		.000	.000	.001
	N	146	146	146	146	146
PRO	Pearson Correlation	.508**	.324**	1	.500**	.349**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	146	146	146	146	146
DRI.1	Pearson Correlation	.339**	.314**	.500**	1	.518**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	146	146	146	146	146
DRI.2	Pearson Correlation	.210*	.276**	.349**	.518**	1
	Sig. (2-tailed)	.011	.001	.000	.000	
	N	146	146	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3. EXTERNAL VARIABLES AND BENEFITS

Correlations

		TCH	PPL	PRO	BCL	BCO	BPU
TCH	Pearson Correlation	1	.378**	.508**	.324**	.295**	.154*
	Sig. (1-tailed)		.000	.000	.000	.000	.032
	N	146	146	146	146	146	146
PPL	Pearson Correlation	.378**	1	.324**	.317**	.327**	.353**
	Sig. (1-tailed)	.000		.000	.000	.000	.000
	N	146	146	146	146	146	146
PRO	Pearson Correlation	.508**	.324**	1	.363**	.470**	.424**
	Sig. (1-tailed)	.000	.000		.000	.000	.000
	N	146	146	146	146	146	146
BCL	Pearson Correlation	.324**	.317**	.363**	1	.751**	.643**
	Sig. (1-tailed)	.000	.000	.000		.000	.000
	N	146	146	146	146	146	146
BCO	Pearson Correlation	.295**	.327**	.470**	.751**	1	.836**
	Sig. (1-tailed)	.000	.000	.000	.000		.000
	N	146	146	146	146	146	146
BPU	Pearson Correlation	.154*	.353**	.424**	.643**	.836**	1
	Sig. (1-tailed)	.032	.000	.000	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

4. BARRIERS AND DRIVERS

Correlations

		BAR.1	BAR.2	BAR.3	DRI.1	DRI.2
BAR.1	Pearson Correlation	1	.461**	.132	.040	.014
	Sig. (1-tailed)		.000	.056	.316	.433
	N	146	146	146	146	146
BAR.2	Pearson Correlation	.461**	1	.434**	.096	.009
	Sig. (1-tailed)	.000		.000	.125	.459
	N	146	146	146	146	146
BAR.3	Pearson Correlation	.132	.434**	1	.151*	-.004
	Sig. (1-tailed)	.056	.000		.035	.479
	N	146	146	146	146	146
DRI.1	Pearson Correlation	.040	.096	.151*	1	.518**
	Sig. (1-tailed)	.316	.125	.035		.000
	N	146	146	146	146	146
DRI.2	Pearson Correlation	.014	.009	-.004	.518**	1
	Sig. (1-tailed)	.433	.459	.479	.000	
	N	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

5. DRIVERS AND BENEFITS

Correlations

		DRI.1	DRI.2	BCL	BCO	BPU
DRI.1	Pearson Correlation	1	.518**	.593**	.552**	.462**
	Sig. (1-tailed)		.000	.000	.000	.000
	N	146	146	146	146	146
DRI.2	Pearson Correlation	.518**	1	.412**	.387**	.425**
	Sig. (1-tailed)	.000		.000	.000	.000
	N	146	146	146	146	146
BCL	Pearson Correlation	.593**	.412**	1	.751**	.643**
	Sig. (1-tailed)	.000	.000		.000	.000
	N	146	146	146	146	146
BCO	Pearson Correlation	.552**	.387**	.751**	1	.836**
	Sig. (1-tailed)	.000	.000	.000		.000
	N	146	146	146	146	146
BPU	Pearson Correlation	.462**	.425**	.643**	.836**	1
	Sig. (1-tailed)	.000	.000	.000	.000	
	N	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

6. BENEFITS AND OPERATIONAL REQUIREMENTS

Correlations

		BCL	BCO	BPU	OPR.1	OPR.2	OPR.3
BCL	Pearson Correlation	1	.751**	.643**	.352**	.186*	.370**
	Sig. (1-tailed)		.000	.000	.000	.012	.000
	N	146	146	146	146	146	146
BCO	Pearson Correlation	.751**	1	.836**	.319**	.164*	.446**
	Sig. (1-tailed)	.000		.000	.000	.024	.000
	N	146	146	146	146	146	146
BPU	Pearson Correlation	.643**	.836**	1	.276**	.179*	.394**
	Sig. (1-tailed)	.000	.000		.000	.015	.000
	N	146	146	146	146	146	146
OPR.1	Pearson Correlation	.352**	.319**	.276**	1	.246**	.368**
	Sig. (1-tailed)	.000	.000	.000		.001	.000
	N	146	146	146	146	146	146
OPR.2	Pearson Correlation	.186*	.164*	.179*	.246**	1	.301**
	Sig. (1-tailed)	.012	.024	.015	.001		.000
	N	146	146	146	146	146	146
OPR.3	Pearson Correlation	.370**	.446**	.394**	.368**	.301**	1
	Sig. (1-tailed)	.000	.000	.000	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

7. DRIVERS AND OPERATIONAL REQUIREMENTS

Correlations

		OPR.1	OPR.2	OPR.3	DRI.1	DRI.2
OPR.1	Pearson Correlation	1	.246**	.368**	.212**	.275**
	Sig. (1-tailed)		.001	.000	.005	.000
	N	146	146	146	146	146
OPR.2	Pearson Correlation	.246**	1	.301**	.169*	.154*
	Sig. (1-tailed)	.001		.000	.021	.031
	N	146	146	146	146	146
OPR.3	Pearson Correlation	.368**	.301**	1	.324**	.139*
	Sig. (1-tailed)	.000	.000		.000	.047

	N	146	146	146	146	146
DRI.1	Pearson Correlation	.212**	.169*	.324**	1	.518**
	Sig. (1-tailed)	.005	.021	.000		.000
	N	146	146	146	146	146
DRI.2	Pearson Correlation	.275**	.154*	.139*	.518**	1
	Sig. (1-tailed)	.000	.031	.047	.000	
	N	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

8. OPERATIONAL REQUIREMENTS AND EFFECTIVE IMPLEMENTATION

Correlations

		POV.1	POV.2	POV.3	OPR.1	OPR.2	OPR.3
POV.1	Pearson Correlation	1	.533**	.585**	.337**	.205**	.415**
	Sig. (1-tailed)		.000	.000	.000	.007	.000
	N	146	146	146	146	146	146
POV.2	Pearson Correlation	.533**	1	.573**	.262**	.142*	.426**
	Sig. (1-tailed)	.000		.000	.001	.044	.000
	N	146	146	146	146	146	146
POV.3	Pearson Correlation	.585**	.573**	1	.290**	.162*	.506**
	Sig. (1-tailed)	.000	.000		.000	.025	.000
	N	146	146	146	146	146	146
OPR.1	Pearson Correlation	.337**	.262**	.290**	1	.246**	.368**
	Sig. (1-tailed)	.000	.001	.000		.001	.000
	N	146	146	146	146	146	146
OPR.2	Pearson Correlation	.205**	.142*	.162*	.246**	1	.301**
	Sig. (1-tailed)	.007	.044	.025	.001		.000
	N	146	146	146	146	146	146
OPR.3	Pearson Correlation	.415**	.426**	.506**	.368**	.301**	1
	Sig. (1-tailed)	.000	.000	.000	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

9. BENEFITS AND OPERATIONAL REQUIREMENTS

Correlations

		BCL	BCO	BPU	OPR.1	OPR.2	OPR.3
BCL	Pearson Correlation	1	.751**	.643**	.352**	.186*	.370**
	Sig. (1-tailed)		.000	.000	.000	.012	.000
	N	146	146	146	146	146	146
BCO	Pearson Correlation	.751**	1	.836**	.319**	.164*	.446**
	Sig. (1-tailed)	.000		.000	.000	.024	.000
	N	146	146	146	146	146	146
BPU	Pearson Correlation	.643**	.836**	1	.276**	.179*	.394**
	Sig. (1-tailed)	.000	.000		.000	.015	.000
	N	146	146	146	146	146	146
OPR.1	Pearson Correlation	.352**	.319**	.276**	1	.246**	.368**
	Sig. (1-tailed)	.000	.000	.000		.001	.000
	N	146	146	146	146	146	146
OPR.2	Pearson Correlation	.186*	.164*	.179*	.246**	1	.301**
	Sig. (1-tailed)	.012	.024	.015	.001		.000
	N	146	146	146	146	146	146
OPR.3	Pearson Correlation	.370**	.446**	.394**	.368**	.301**	1
	Sig. (1-tailed)	.000	.000	.000	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (1-tailed).

* Correlation is significant at the 0.05 level (1-tailed).

10 BARRIERS AND OPERATIONAL REQUIREMENTS

		BAR.1	BAR.2	BAR.3	OPR.1	OPR.2	OPR.3
BAR.1	Pearson Correlation	1	.461**	.132	-.139	-.014	-.035
	Sig. (2-tailed)		.000	.112	.094	.871	.677
	N	146	146	146	146	146	146
BAR.2	Pearson Correlation	.461**	1	.434**	-.197*	.015	.021
	Sig. (2-tailed)	.000		.000	.017	.859	.805
	N	146	146	146	146	146	146
BAR.3	Pearson Correlation	.132	.434**	1	.007	-.036	-.031
	Sig. (2-tailed)	.112	.000		.933	.668	.712
	N	146	146	146	146	146	146
OPR.1	Pearson Correlation	-.139	-.197*	.007	1	.246**	.368**
	Sig. (2-tailed)	.094	.017	.933		.003	.000
	N	146	146	146	146	146	146
OPR.2	Pearson Correlation	-.014	.015	-.036	.246**	1	.301**
	Sig. (2-tailed)	.871	.859	.668	.003		.000
	N	146	146	146	146	146	146
OPR.3	Pearson Correlation	-.035	.021	-.031	.368**	.301**	1
	Sig. (2-tailed)	.677	.805	.712	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

11. BARRIERS AND POTENTIAL VALUES OF EFFECTIVE IMPLEMENTATION

Correlations

		INSTB	PROB	PPLB	PROV	COMV	STRV
INSTB	Pearson Correlation	1	.461**	.132	-.012	-.070	-.018
	Sig. (2-tailed)		.000	.112	.890	.400	.830
	N	146	146	146	146	146	146
PROB	Pearson Correlation	.461**	1	.434**	.095	.142	.125
	Sig. (2-tailed)	.000		.000	.252	.087	.131
	N	146	146	146	146	146	146
PPLB	Pearson Correlation	.132	.434**	1	.160	.153	.104
	Sig. (2-tailed)	.112	.000		.053	.065	.212
	N	146	146	146	146	146	146
PROV	Pearson Correlation	-.012	.095	.160	1	.532**	.485**
	Sig. (2-tailed)	.890	.252	.053		.000	.000
	N	146	146	146	146	146	146
COMV	Pearson Correlation	-.070	.142	.153	.532**	1	.502**
	Sig. (2-tailed)	.400	.087	.065	.000		.000
	N	146	146	146	146	146	146
STRV	Pearson Correlation	-.018	.125	.104	.485**	.502**	1
	Sig. (2-tailed)	.830	.131	.212	.000	.000	
	N	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).

12. EXTERNAL VARIABLES AND POTENTIAL VALUES OF EFFECTIVE IMPLEMENTATION

Correlations

		TCH	PPL	PRO	Barriers	Drivers	perational	implementation
TCH	Pearson Correlation	1	.378**	.508**	.021	.315**	.211*	.027
	Sig. (2-tailed)		.000	.000	.797	.000	.011	.749
	N	146	146	146	146	146	146	146
PPL	Pearson Correlation	.378**	1	.324**	-.102	.339**	.242**	.179*
	Sig. (2-tailed)	.000		.000	.221	.000	.003	.031
	N	146	146	146	146	146	146	146
PRO	Pearson Correlation	.508**	.324**	1	.032	.488**	.387**	.232**
	Sig. (2-tailed)	.000	.000		.700	.000	.000	.005
	N	146	146	146	146	146	146	146
Barriers	Pearson Correlation	.021	-.102	.032	1	.080	-.075	.108
	Sig. (2-tailed)	.797	.221	.700		.337	.369	.195
	N	146	146	146	146	146	146	146
Drivers	Pearson Correlation	.315**	.339**	.488**	.080	1	.330**	.254**
	Sig. (2-tailed)	.000	.000	.000	.337		.000	.002
	N	146	146	146	146	146	146	146
operational	Pearson Correlation	.211*	.242**	.387**	-.075	.330**	1	.491**
	Sig. (2-tailed)	.011	.003	.000	.369	.000		.000
	N	146	146	146	146	146	146	146
implementation	Pearson Correlation	.027	.179*	.232**	.108	.254**	.491**	1
	Sig. (2-tailed)	.749	.031	.005	.195	.002	.000	
	N	146	146	146	146	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX E

Anova: Single Factor

Delphi Round 1 and 2

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4.42	20	80.67	4.0335	0.228592
4.58	19	75.32	3.964211	0.178748

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.046779	1	0.046779	0.228924	0.635138	4.105456
Within Groups	7.560718	37	0.204344			
Total	7.607497	38				

Anova: Single Factor Delphi Round 2 and 3

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4.58	19	75.32	3.964211	0.178748
4.08	19	71.5	3.763158	0.120889

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.384011	1	0.384011	2.563168	0.118119	4.113165
Within Groups	5.393474	36	0.149819			
Total	5.777484	37				

Anova: Single Factor Delphi rounds 1, 2 and 3

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4.42	20	80.67	4.0335	0.228592
4.58	19	75.32	3.964211	0.178748

4.08	19	71.5	3.763158	0.120889

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.76188	2	0.38094	2.151821	0.125961	3.164993
Within Groups	9.736729	55	0.177031			
Total	10.49861	57				

APPENDIX F

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	12	100.0
	Excluded[a]	0	.0
	Total	12	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.302	.410	6

Item Statistics

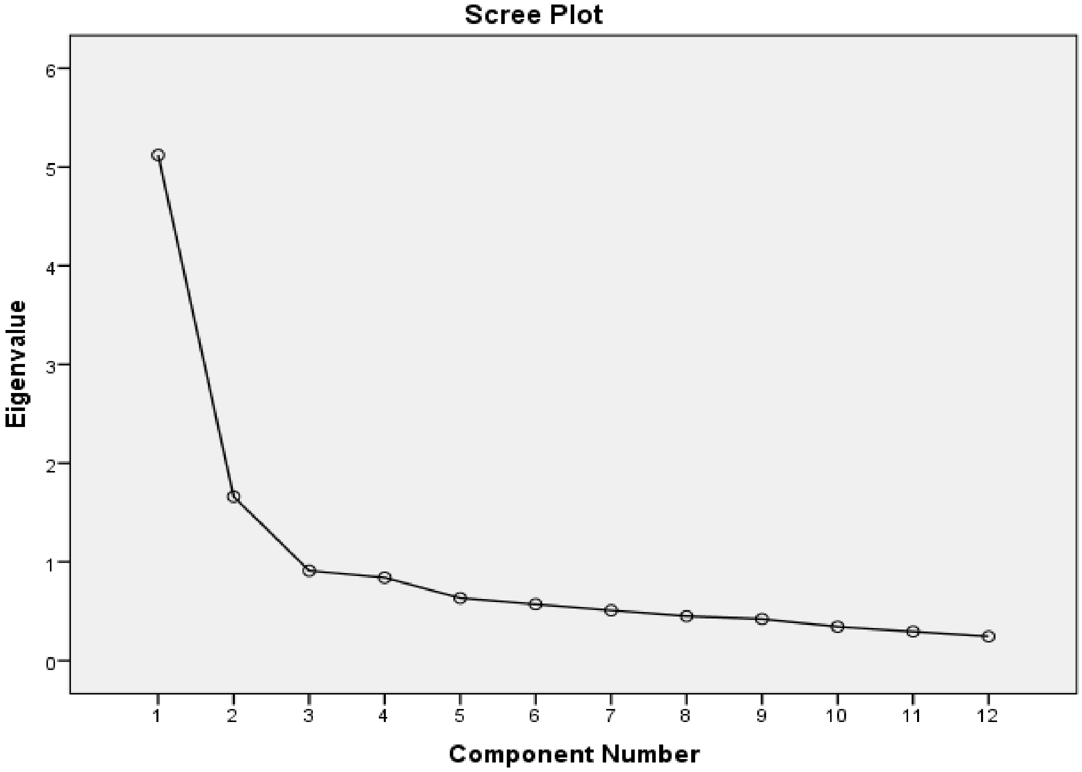
	Mean	Std. Deviation	N
PRO1	3.5455	1.12815	11
PRO2	3.2727	1.34840	11
PRO3	4.1818	.98165	11
PRO4	4.0000	1.41421	11
PRO5	3.0000	1.34164	11
PRO6	3.4545	1.50756	11
PRO7	3.5455	.82020	11

Inter-Item Correlation Matrix

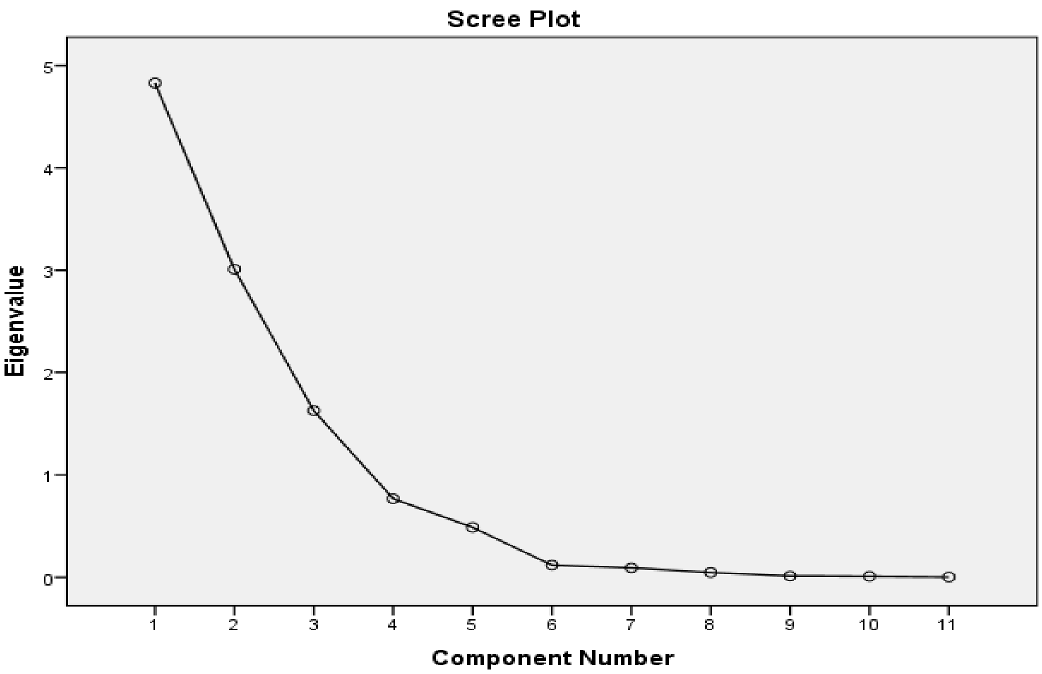
	PRO1	PRO2	PRO3	PRO4	PRO5	PRO6	PRO7
PRO1	1.000	.353	.443	.439	-.462	.134	.079
PRO2	.353	1.000	.337	.315	.000	.130	.123
PRO3	.443	.337	1.000	.792	.228	.749	-.135
PRO4	.439	.315	.792	1.000	.264	.750	-.172
PRO5	-.462	.000	.228	.264	1.000	.494	-.091
PRO6	.134	.130	.749	.750	.494	1.000	.022
PRO7	.079	.123	-.135	-.172	-.091	.022	1.000

APPENDIX G

1. Scree plot for Drivers of electronic-procurement implementation



2. Scree plot for Barriers to implementation of electronic-procurement



3. Scree plot for operational requirements for electronic-procurement implementation

4. Scree plot for potential values from electronic-procurement implementation