INFLUENCE OF PROCUREMENT BLOCKCHAIN TECHNOLOGY ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

I hereby declare that this research project is my original work and that it has not been presented in any other learning institution for academic purposes or any other reason except for the references.

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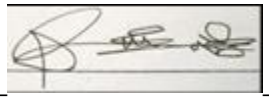
I do hereby confirm that I have examined the master's project and have approved it for examination.



Signature ……. Date……01/11/2022……

Dr. Jackson Ndolo **Supervisor**

DEDICATION

I dedicate this project to my dear dad, my mum, sisters, my classmates and friends whose words of inspiration, patience and moral support have been my source of encouragement. God bless you abundantly.

ACKNOWLEDGEMENT

I dedicate my vote of thanks First; to the almighty God for the grace during the period I was developing this project. Second, I thank my family for their unwavering support during the long hours of intense work in the entire period. Third, to my supervisor Dr. Ndolo for his devoted guidance that facilitated my research writing. Last, I would like to acknowledge SOB and my classmates who assisted me during time of consultation.

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ABBREVIATIONS AND ACRONYMS

ERP: Enterprise Resource Planning

FY: Financial Year

GDP: Gross Domestic Product

ICT: Information Communication Technology

MRO: Maintenance Repair and Operating

PPADA: Public Procurement and Asset Disposal Act

PPRA: Public Procurement and Regulatory Authority

SCP: Structure Conduct Financial performance

SPSS: Statistical Package for Social Sciences

SRM: Supplier Relationship Management

OPERATIONAL DEFINITION OF TERMS

Operations Visibility: Refers to an important feature of supply chains that is intimately linked to firms' operations and information transparency. Moreover, practitioners and academics generally accept SCV as important to operations and information flows within the supply chain (Koumanakos, 2018).

Financial performance of Banks: This refers to the several key indicators of financial performance such as profitability, customer satisfaction, market share liquidity of the banking sector, assets quality among others (Sushma & Phubesh, 2019).

Procurement BlockChain Technology: Refers to a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An a*sset* can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding). Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved (Mattson, 2019).

Real Time Settlement: Refers to an electronic payments and settlement system which is designed for to increase efficiency in payments and settlement, while at the same time reduce settlement risks. a real time settlement system is an online system allowing the instantaneous transfer and settlement of funds and securities between banks (Danese, 2019).

Smart Contracts: This can be defined as a self-executing contract that utilizes blockchain technology to digitally enforce, verify or facilitate the financial performance or negotiation of a contract (Christidis & Devetsikiotis, 2016). Owing to the security and decentralized system exhibited by blockchain technology, smart contracts can foster transaction credibility between contracting parties without the necessity of third parties as exhibited in normal contracts.

Smart Order Management: This can be defined as the use of internet-based (integrated) technologies to carry out individual or all stages of the procurement process including search, sourcing, negotiation, ordering, receipt and post-purchase review (Markland, 2020).

ABSTRACT

Blockchain solutions are receiving substantial interest in almost every industry, particularly banking, with major investments being made on a global scale. Procurement is one of the most prominent areas in which blockchain technology is being applied. The purpose of the study was to examine the influence of procurement blockchain technology on financial performance of banks in Kenya with an aim of making recommendations on proper use of procurement blockchain technology practices. The study aimed to establish how real time settlement, smart contracts, operations visibility and smart order management influence financial performance of banks. To achieve this, the study reviewed both theoretical and empirical literature and propose the research methodology that addressed the gaps identified in literature as well as answer the stipulated research questions. This research study adopted descriptive research design approach. The researcher prefers this method because it allows an in-depth study of the subject. The target population consist of commercial banks in Kenya and unit of analysis was the procurement departments. The unit of observation was 39 heads of procurement, 39 heads of finance and 39 heads of ICT in all banks. The sample size was 117 respondents. Data was collected using self-administered questionnaires. The data collected was analyzed by use of descriptive and inferential statistics. Multiple regression model was used to show the relationship between the dependent variable and the independent variables. The data generated was keyed in and analyzed by use of Statistical Package of Social Sciences (SPSS) version 22 to generate information which was also be presented using tables, charts and frequencies. The response rate of the study was 79.49%. The findings of the study indicated that real time settlement, smart contracts, operations visibility and smart order management have a positive relationship with financial performance of commercial banks. Finally, the study recommended that institutions should embrace procurement block chain technology so as to improve financial performance and further researches should to be carried out in other institutions to find out if the same results can be obtained.To ensure that commercial banks have better financial performance they should focus more on adhering to real time settlement so as to ascertain the realistic procurement cycle attainable by vendors, their realistic technical capacity and ensure that there is consistency of quality in goods supplied.With regard to the second objective, it would be constructive for commercial banks to invest more in tamper-proof systems to reduce the cost of procurement through unnecessary reworks and ensure professional employees get it right the first time. In relation to operations visibility, the organizations should form strategic technological alliances with their vendors so as to have a more improved working relationship characterized by critical supplier credentials and verifiable audit trails. Concerning smart order management, there is need for commercial banks to always set aside a substantial part of their resources for activities that influence its core operations. This is because decisions made here have major effects on the bank's sustainability in the market.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Blockchain solutions are receiving substantial interest in almost every industry, particularly banking, with major investments being made on a global scale. Procurement is one of the most prominent areas in which blockchain technology is being applied. World over, there have been numerous attempts to explain financial performance of banks in the fields of strategic management, accounting, finance, marketing and management science. Naturally each of these areas concentrates on different explanatory variables. In the US, Chen, Frank & Wu (2020) studied the effect of technology on long term stock price financial performance of banks.

In Malaysia, Wad (2018) examined the relationship between procurement blockchain technology practices and financial performance of banks. The study measured the manager's perceptions of smart contracts and the level of financial performance in the industry. In his study on procurement block chain technology in developing countries in Africa, Gavirneni (2021), states that ineffective use of procurement block chain technology is a major problem faced by banks in developing countries and that even the very basic block chain concepts and techniques are not used by the majority of the banks studied.

Blockchain adoption is primarily used in real-time accounting and auditing, proxy voting, digital identity authentication, credit and loans and greatly enhances the transparency of ownership and modifications in ownership in the banking industry. Nigerian survey revealed that 31% of procurement block chain technology users in the banking sector experienced financial performance improvement. 31% of the banks surveyed claimed a decrease in customer complaints, as compared with 25% who claimed an increase in delivery speeds. This indicates that customers are satisfied not only with the better service quality, but also with the bank's ability to cater to their changing needs in a timely manner (Kannan, Grigore & Senthikumar, 2020). A bank will sustain competitive advantage by employing appropriate procurement block chain technology.

Currently, blockchain technology is a rapidly growing approach that has garnered global interest due to its proficiency in minimizing threats and deceptions (Piazza, 2017). Also, it has the potential to deliver innovative solutions to corporate governance inadequacies significantly by strengthening the connection between shareholders and the organization (OECD, 2018).

According to Muiruri (2017), there is increasing need for business enterprises to embrace effective procurement block chain technology practices as a strategy to improve their competitiveness. Similarly, Kakwezi and Nyeko, (2021) in their study of 23 Ugandan banks established that procurement block chain technology policies had a role to play in their profitability financial performance. According to Gitman (2021), profit is an index for measuring financial performance. Banking financial performance is a combination of practices; hence several financial performance measures can be used efficiently.

1.1.1 Procurement Block Chain Technology

Blockchain provides a distributed ledger system by utilizing a numerical encryption feature that enables participants to consent to the transaction authorization (Singh et al., 2019). Transaction-related data is collected in blocks. These blocks are then evaluated and validated by the network and added to the network in sequential order including all participants. The network is then provided with a distributed ledger of verified transactions (Vranken, 2017).

Industry attention has recently shifted toward second- generation blockchain applications, such as digitalizing ownership of assets, copyrighted material, and smart contracts (Yoo, 2017). Also, leading banks and financial organizations are investigating the possibility of using this technology in a variety of aspects of their operations, including payments, trading, and other transaction-based activities (Beck and Muller-Bloch, 2017).

Blockchain technology is gaining attention as a means of enabling businesses to conduct and authenticate financial transactions on a network quickly and without the intervention of a primary authority (Beck and Muller-Bloch, 2017). Common banking and financial processes depended on a primary authority or intermediary to initiate or facilitate payments, but

blockchain technology enables a distributed network of computers to establish an agreement with no need for this intermediary (Christidis and Devetsikiotis, 2016).

There are several existents and emerging use cases for blockchain in banking. According to Chris Huls (Lead Tech Lab at Rabobank), blockchain is brimming with possibilities and there are countless blockchain use cases. Yet, banks should concentrate on one or two use cases and excel rather than concentrating on all use cases simultaneously, if they do so, they may ultimately be embraced. As per FinTech (2018), four prospective blockchain use cases for banks are suggested: Fraud mitigation, distinguish your client, platform for trading, and bank payments.

However, many hurdles remain for banks until blockchain can be completely deployed as a credible alternative worth of public trust. The major hurdle point is privacy, with an open ledger system, ensuring the privacy of consumer data grows intrinsically challenging. Though this may be alleviated in certain ways through the use of private or permissioned blockchains with effective encrypting, there would still be certain safety issues for the public trusts a blockchain solution with their confidential data (Casino et al., 2019).

Numerous banks in the UK are researching blockchain as a possible solution, as it is regarded as a disruptive technology with the potential to accelerate transactions, enhance visibility and trust, and minimize agency costs (Singh et al., 2019). PwC demonstrated ways blockchain could be utilized in retail and consumer banking in the UK. In particular, blockchain can be applied in mortgages as it generates distributed copies of legal agreements, digital audit log, expedite the process of releasing funds via concurrent title and payment transfers, potential to accelerate the distribution of funds and minimize the time required to complete a contract by automating the process stages using smart contracts. Integrity, indestructibility, data control, and protection are cited as factors why blockchain is a preferable alternative to current loyalty programs in banks. Therefore, by distinguishing your client idea, blockchain enables clients to own and manage a unique digital identity (PwC, 2016).

1.1.2 Financial Performance of Commercial Banks

The financial sector is crucial to the economies of various countries, and banks remain a core of the sector, especially in developing economies where the capital market is not strong enough (Akaranga, 2018). The banking sector in Africa and the rest of the developing world has experienced major transformation in its operating environment. Most organizations view their financial performance in terms of effectiveness in achieving their mission, purpose or goals ((Tukamuhabwa, 2020).

In the year to December 2017, the banking sector registered a decline in financial performance of 9.6% to Ksh. 133.2B from Ksh.147.4B in December 2016 in pre-tax profits. Similarly, asset quality registered a decline with the non-performing loans (NPLs) ratio increasing from 9.3% in December 2016 to 12.3 % in December 2017 (Central Bank, 2022). . The sectors gross loans and advances also decreased by 5.68 %. In assessing the soundness of the commercial banks, the central bank noted a decline in the overall rating in December 2017 from December 2016 which was attributed to a decline in capital adequacy and a deterioration in asset quality in 2017 (Central Bank, 2022).

Most organizations see their financial performance in terms of their efficiency in deploying resources. This relates to the optimal use of resources to obtain the results desired. Finally, in order for an organization to remain viable over time, it must be both financially viable and relevant to its stakeholders and their changing needs. The overall financial performance of the organization may be optimized (Kobia & Mohammed, 2019). Technology plays a big part in the banking sector as it accounts for about 56% of the annual turnover (Abdifatah, 2020).

Kenyan banks are faced with a lot competition in the current markets. This has led to the need for coming up with better method of managing and measuring how resources are utilized by various jobs or products, and therefore be able to eliminate any wastage in the value chain. The new cost management methods require having the right persons doing the right job (Mamiro, 2021). With the tremendous improvements in real time settlement and

communication, procurement block chain technology is set to improve in Kenyan banking industry (Mukasa, 2019).

Kenyan banks are not practicing professionals in procurement block chain technology and that procurement block chain technology was more suited for large firms. Lack of enough people with know-how in procurement block chain technology locally has actually contributed to lack of recognition of the same. As compared to America and Japan, most Kenyan, banks have a long way to go in- terms of effective and efficient procurement block chain technology (Nyeko, 2020).

Oyuke and Shale (2017), explains that banks which are able to manage their long-term business relationship by crafting mutually beneficial supply chains. The primary objective of procurement block chain technology is to fulfill customer demands through the most efficient use of resources, including distribution capacity, inventory, labor and by companies carefully selecting among all the options (rapid response, capacity adjustments, least cost approach and a combination of all these), procurement block chain technology can be tailored to 'fit' the physical and market needs of the specific products it moves and prevent supply disruptions (Seleim, 2019).

1.1.3 Commercial Banks in Kenya

The Banking industry in Kenya is governed by the Companies act, the Banking act. the Central Bank of Kenya act and the various prudential guidelines issued by the Central Bank of Kenya (CBK). The banking sector was liberalized in 1995 and exchange controls lifted. The banking industry performs a vital role in the economy by facilitating financial services that deal with funds, payments, and transfers to individuals and businesses that promote and contribute to sustainable economic development (Amadeo, 2021). Additionally, it is extensively approved that a banking system that is properly structured is defined by its governance, supervisory practices and risk taking and promotes greater financial performance and economic stability (Vianney, 2018).

A majority of banks entered the Kenyan market in 1950s mainly from India and South Africa. The post-independence bank developments was as a result of emphasis on capitalist economy, attracting foreign investment and maintaining policies of Africanization of the economy facilitated by several political and regulatory factors. After 1978, a number of the institutions were closed after encountering liquidity troubles. The banking sector underwent rounds of bank failures in mid 1980s and 1990s (Ngugi, 2021).

The main causes leading to this crisis included; undercapitalization, non-performing loans, over investing in speculative property market which faced declining prices, insider lending to directors, and loans extended to unviable projects under influence of government officials (Ngugi, 2021). at that time, CBK lacked adequate capacity to regulate the highly politicized sector necessitating the government to pass the Banking act, 1989 which tightened the requirement for the licensing of new financial institutions (CBK, 2018).

The banking sector's profit before tax increased by 20.5 per cent from Kshs74.3 billion in December 2020 to Kshs89.5 billion in December 2021. Net loans and advances recorded a growth of 31.4 per cent from Kshs876.4 billion to Kshs1.152 trillion in December 2021. In 2020, bank lending as domestic credit was Kshs1.275 billion broad money supply rose by 21.6 per cent to Kshs1.272 billion (Central bank of Kenya, 2021).

Total deposits and total assets held by financial institutions both recorded growth rates of 22.9 per cent and 24.1 per cent respectively. The country's banking sector has recorded exponential growth with bank branches rising from 534 as at December 2016 to more than 1,000 in 2021. The number of rural branches has grown by more than 150 per cent compared to over 70 per cent growth in urban areas over the same period, which has highly boosted financial inclusion in the country (Central bank of Kenya, 2021).The Government has reformed banking to make it internationally competitive. In 2007, the Ministry of Finance proposed to raise bank capital from Sh250 million to Sh 1 billion by 2010. Foreign banks (Nigerian, South African and others) are investing in low-capital institutions (Central bank of Kenya, 2021).

1.2 Statement of the Problem

The banking industry performs a vital role in the economy by facilitating financial services that deal with funds, payments, and transfers to individuals and businesses that promote and contribute to sustainable economic development (Amadeo, 2021). According to statistics from Central bank of Kenya (2019), the Kenya commercial bank in 2017 reported a 42.7 per cent drop in profits to Sh629 million from Sh1.64 billion a year earlier and the banking sector recorded a decline in financial performance and in some banks the total operating expenditure increased by 2% compared to similar period in 2016. Commercial banks play a very key role in the economic growth of any country. The sector contributed 5.4% of the GDP in 2019 with a potential to contribute 8% to 15% (CBK, 2017) compared to 22% in South Africa and Ghana at 28%. In addition, they hold assets worth 63% of the GDP.

Buxey (2019) believes that procurement block chain technology is the central instrument to assist the efficient management of resources in an organization. Many procurement block chain technology models have been developed; but very few Kenyan commercial banks run fully developed procurement block chain technology departments (KBA, 2021). Due to non-recognition of the procurement block chain technology contribution in the banking industry by management, gaps do exist on how the function is managed from the point of identification of the need, sourcing for suppliers, delivery of the need and after delivery activities of the need (Wambui, 2021).

However, banks are faced with a challenge of increasing stakeholders' satisfaction, and notably, the wealth maximization of shareholders. With the increasing competition in the banking industry, management does not have direct control over the income streams of the bank and thus the need to focus on the management of the institutions' expenditures (Gitman, 2021). Given the contractual nature of personnel expenditures, management is left with only the procurement block chain technology related expenditures and thus the need to study the influence of procurement block chain technology on the financial performance of the banking sector.

Several studies have been done on the influence of procurement block chain technology on financial performance, at the global level; Gachon and Fisher (2020) examined the relationship between a firm's procurement block chain technology and its financial performance. They noted that procurement block chain technology enables a firm to strengthen its competitive position and facilitates integration with 82% adoption resulting to 25% change in financial performance.

Locally a number of studies have been done on the role of procurement block chain technology on financial performance in other industries other than the banking industry in Kenya (Waweru, 2020; Birchogo, 2017). Despite the numerous studies on the role of procurement block chain technology benefits on financial performance, studies have been in other contexts, geographically and methodologically, the banking industry specially in Kenya has been largely neglected and therefore this study is intended to bridge the methodical, knowledge and contextual gaps and seeks to determine the influence of procurement block chain technology on financial performance of commercial banks in Kenya.

1.3 Objectives of the Study

1.3.1 The General Objective of the Study

The main objective of the study was to establish the influence of procurement blockchain technology on financial performance of commercial banks in Kenya.

1.3.2 Specific Objectives

i. To assess the influence of real time settlement on financial performance of commercial banks in Kenya.
ii. To evaluate the influence of smart contracts on financial performance of commercial banks in Kenya.
iii. To determine the influence of operations visibility on financial performance of commercial banks in Kenya.
iv. To establish the influence of smart order management on financial performance of commercial banks in Kenya.

1.4 Research Questions

These research questions helped the researcher in her quest to collect the relevant information on the research topic:

i. How does real time settlement influence financial performance of commercial banks?
ii. To what extent do smart contracts influence financial performance of commercial banks?
iii. How does operations visibility influence financial performance of commercial banks?
iv. How does smart order management influence financial performance of commercial banks?

1.5 Significance of the Study

Effective management of procurement blockchain technology is an integral way of securing competitive advantage and improving organizational financial performance. This is so because of the shift in paradigm with respect to competition. The competition that exists today is between supply chains as opposed to being between organizations (Jackson, 2019). The findings will be instrumental for the following groups:

1.5.1 Government of Kenya

The study will also help policy makers in evaluating the present procurement block chain technology strategies and identify areas that can be improved in the operations. It may help the policy makers within public sector to identify crucial areas in their organizations and make appropriate decisions to ensure that effective procurement block chain technology is critically emphasized on (Sari, 2018).

1.5.2 Procurement Departments in Banks

Through this study, managers in banking institutions may learn and make responsible strategic plans and policy decisions regarding procurement block chain technology that are meant to facilitate and sustain high organizational financial performance. also, the study pin points companies that have managed to apply these practices thus helping interested departments to use them as case studies for their own planning and growth (Schmidt, 2019).

1.5.3 Stakeholders in the Banking Industry

The findings may also provide a useful reference document to stakeholders in the banking and other institutions in their endeavors to adopt procurement block chain technology to meet their required financial performance. These include procurement professionals, institutions, contractors and suppliers in the supply chain industry; the study provides useful, relevant and up to date information on the best procurement block chain technology practices, limitations and challenges. It also provides recommendations which will come in handy during implementing by the stakeholders (Talluri, Cetin & Gardner, 2020).

1.5.4 Researchers and Students

Scholars, students and other researchers may also find the study helpful to identify further areas of research built on the findings of this research. The study may be a source of reference material for future researchers on other related topics; it may also help other academicians who undertake the same topic in their studies. The findings from the study may particularly be useful to scholars in providing additional knowledge to existing and future banking institutions in Kenya on the influence of procurement block chain technology on financial performance in the banking sector in Kenya to enable them remain competitive (Tanskanen & Holmstrom, 2019).

1.6 Scope of the Study

The study's scope lies in assessing influence of procurement block chain technology on financial performance in the banking sector in Kenya. Procurement block chain technology is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. an a*sset* can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding). Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved (Tokar & Williams, 2018). Variables that will be covered in this study are real time settlement, smart contracts, operations visibility and smart order management. They are core variables that influence procurement block chain technology in any organization. The study was conducted at all commercial banks in Kenya. The target population consisted of

commercial banks in Kenya and unit of analysis was the procurement, ICT and finance departments. The unit of observation was 39 heads of procurement, 39 heads of finance and 39 heads of ICT in all banks. The sample size was 117 respondents. These are considered as major respondents of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter involves literature review where a deeper look in the subject matter is done. It comprises of; theoretical review, conceptual framework, empirical review, critique of literature, summary and research gaps.

2.2 Theoretical Review

A theory is a generalization about a phenomenon, an explanation of how or why something occurs. It is any statement that explains what is measured or described about cause or effect implicitly (Kumar, 2018). Theories describe, explain, predict, or control human phenomena in a variety of contexts. Thus, it is a collection of interrelated statements or principles that explains the major theories in relation to the effects of procurement block chain technology on financial performance of banks.

2.2.1 Innovation Diffusion Theory

Diffusion of innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread. Everett Rogers, a professor of communication studies, popularized the theory in his book Diffusion of Innovations; the innovation must be widely adopted in order to self-sustain. Diffusion of Innovation (DOI) theory is a popular model used in information systems research to explain user adoption of new technologies. Rogers defines diffusion as ‘the process by which an innovation is communicated through certain channels over time among the members of a social society’ (Ming-Ling & Shaw, 2020). An innovation is an idea or object that is perceived to be new.

According to DOI, the rate of diffusion is affected by an innovation’s relative advantage, complexity, compatibility, trialability and observability. Johnson, Scholes and Whittington (2018) define relative advantage as ‘the degree to which an innovation is seen as being superior to its predecessor’. Complexity, which is comparable to perceived ease of use construct, is ‘the degree to which an innovation is seen by the potential adopter as being

relatively difficult to use and understand'. Compatibility refers to 'the degree to which an innovation is seen to be compatible with existing values, beliefs, experiences and needs of adopters. Trialability is the 'degree to which an idea can be experimented with on a limited basis. Finally, observability is the 'degree to which the results of an innovation are visible' (Gunasekaran, 2020).

The advantage of the improved system which has real time settlement is that it has allowed for better satisfaction between the banks and the consumer. Banks, aided by technological developments such as real time settlement, have responded better to the challenges they face by adopting a new strategy, which emphasizes on attempting to build customer satisfaction through offering better products and services and at the same time to minimize operation costs. The diffusion theory is relevant because it explains the reason why banks adopt technical innovations such as which has real time settlement. One of the reasons why banks adopt technical innovations is relevant advantage. This means that banks that adopt technical innovations have relatively better financial advantage than those who do not (Imadsaid, 2020).

2.2.2 The Resource Based Theory

Resource Dependence Theory (RDT) promoted by Pfeffer and Salancikin is the study of how the exterior resources of an organization affect the financial performance of the organization. The procurement of exterior resources such as smart contracts with different parties is a significant tenet of both the strategic and tactical management of any company, an implication in the procurement efficiency of the buying firms especially in tapping into the connection with suppliers as their important and dependable associates through resources such as just in times systems of delivery (Gachon & Fisher, 2020).

Thus, this theory props up the concept of procurement block chain technology, RBT proposes that actors lacking in crucial resources will seek to create relationships with (i.e., be dependent upon) others in order to acquire required resources such as smart contracts. Just like sellers on buyers for precious markets and buyer will depend on suppliers for external resources. also, organizations endeavor to alter their reliance relationships by

lessening their own reliance or by increasing the dependence of other organizations on them. Within this viewpoint, organizations are viewed as coalitions alerting their structure and patterns of behavior to acquire and maintain required external resources (Kimutai, 2021). This theory, resource-based view (RBV) emphasizes the firm's resources as the fundamental determinants of competitive advantage through smart contracts.

The argument goes if all firms in a market have the same stocks of resources; no strategy is available to one firm that would not also be available to all other firms in the market, berg (2019). The RBV is an efficiency and effectiveness-based explanation of financial performance differences. Dominick and Lunney (2020), explain that organizational financial performance is attributed to resources such as smart contracts having intrinsically different levels of efficiency and effectiveness in the sense that they enable the firms to deliver to their customers at different financial performance levels.

2.2.3 The Theory of Constraints

Theory of constraints is an approach to the management of operations and it was developed by Goldratt. It provides a management theory of how organizations should be run. The concept was extended to theory of constraints (TOC) with a publication which views any manageable system as being limited in achieving more of its objectives by a very small number of constraints, such as operations visibility.

There is always one constraint and the TOC uses a focusing process to identify the constraint and restructure the organization around it, this can be done by making operations more visible using block chain technology (Berg, 2019). TOC emphasizes on the optimization of financial performance within a defined set of constraints of the existing process and it provides an action framework which combines the activities of the managers and the visible system elements.

TOC views organizations as systems consisting of resources, which are linked by the processes they perform. The goal of the organization serves as the primary judge of success.

Within that system, a constraint is defined as anything that limits the system from achieving higher financial performance relative to its purpose (Buxey, 2019).

The pervasiveness of interdependencies within the organization makes the analogy of a chain, or network of chains, very descriptive of a system's processes. Just as the strength of a chain is governed by its single weakest link, the TOC perspective is that the ability of any organization to achieve its goal is governed by a single, or at most very few, constraints. In the context of this study one of the variables of procurement block chain technology will show the linkage to one of the measures used to measure the financial performances of organizations in the banking sector.

2.2.4 The Transaction Cost Economic Theory

Transaction cost economics (TCE) has been the predominant theory used to examine order management and warehousing decisions. TCE tenets imply that sourcing and order decisions involve a comparison of the production costs incurred from producing a process or product internally with the transaction costs associated in purchasing a process or product from an external source (Danese, 2019).

The total transaction costs included in the order management decision include the direct economic costs associated with sourcing service development and delivery, transaction-based monitoring and control costs incurred to ensure that the buyer acts in the best interest of the firm, and mediation and legal costs accrued should the buyer act in a manner inconsistent with the terms of the order management contract (Gitman, 2021).

Beyond individual sourcing transactions, firms should consider and manage transactions from a holistic perspective, this may entail smart orders. In such cases, the level of analysis implied by TCE moves from the individual transaction to the network of smart sourcing transactions at the organizational level, with firms making smart sourcing decisions that maximizes the economic value added from interactions with sourcing partners (Imadsaid, 2020).

The overall value of these sourcing interactions includes the minimization of economic costs incurred from managing a nexus of smart sourcing transactions, as well as maximizing the value of network connections and other knowledge gained from smart sourcing relationships and transactions; this is very applicable in procurement functions in the banking sector.

2.3 Empirical Review

There are a few studies illustrating how financial performance of banks is affected by procurement block chain technology, Donald (2019), observed that financial institutions are faced with the challenge of meeting high financial performance targets while using the few resources to deliver effective and efficient services demanded by their customers.

2.3.1 Real Time Settlement and Financial performance of Commercial Banks

According to Maftalac *et al* (2018). the benefits of a real time settlement system to its major users include the following: flexible liquidity management - In order to reduce risk, large-value net settlement systems have to respect binding intraday limits on participants' positions, which normally cannot be increased during the day. Once these limits have been reached, payments are blocked.

Liquidity is effectively trapped in the net settlement system until at the end of the day when the balances of such netting systems are settled by means of a payment through the real time settlement system environment. However, in real time settlement system, liquidity can in principle be available to participants at all times through the provision of collateralized intraday credit to participants. The study revealed that any effort to measure financial performance results to positive results because real time settlement is focused on organization’s objectives thus improving financial performance. However, the study failed to relate real time settlement to financial performance effectiveness.

According to Central Bank of Kenya’s Framework and Strategy Document (2018). Kenya’s payment’s system has been beset by problems such as inherent settlement risks; over reliance of cash as a medium for settling financial obligations by the paying public: the use

of cheques to settle high value payment transactions; unregulated card based payment system; fragmented payment systems; lack of information and systems to manage the inter-bank exposures resulting from payment transactions o f banks' customers and the implicit dependence on the financial backing of the central bank to ensure that clearing banks will be able to settle their daily exposure to one another. The report was too broad and failed to address specific areas such as quantified effects of real time settlement on financial performance.

According to Kiptepkut (2017), real time system refers to the economy-wide payment system or the entire web of payment instruments in an economy. It consists of a number of individual payment systems which are broadly categorized into two groups: wholesale as well as retail. a payment system has also been defined as “incorporating particular set of payment instalments, technical standards for the transmission of payment messages and agreed means of settling claims among system members, including use of a nominated settlement institution. The study revealed that real time settlement instill discipline to institutions by ensuring adherence to strategic plans, sector plans and entities vision. The study noted that the real time settlement paradigm enabled recognition of performers from nonperformers thus leading to a competitive advantage.

According to Sheppard (2019), poorly designed systems can contribute to systematic crises if risks are not adequately contained, with the result that financial shocks are passed from one participant to another. Furthermore, inefficient settlement system will chock up the banking or financial markets, thereby causing distrust from the public. The effects of such disruption could extend beyond the system and its participants, threatening the stability of money markets and ot other domestic and international financial markets.

Payment systems are crucial for the economy, and their safety and efficiency should be part of objectives of public policy. They are vital elements in the financial infrastructure of the economy acting as a necessary channel for effective economic management particularly through monetary policy and a means of promoting economic efficiency. Effective and efficient payment systems are vital for the economic development of emerging

economies. The study found a positive linear function between real time settlement and financial performance. Financial performance leveled off or decreased only when limits of real time settlement ability were reached.

2.3.2 Smart Contracts and Financial performance of Commercial Banks

Luu et al., (2016), examined the security of transactions in smart contracts by investigating the smart contracts that run on the Ethereum blockchain technology. According to the authors, the Ethereum smart contract system has presently seen increased adoption and holds virtual coins tuning to millions of dollars (D'Alfonso, Langer, & Vandelis, 2016; Luu et al., 2016). It is worth noting that majority of the smart contract system today are often run-in synchrony with the respective cryptocurrencies.

As at present, Bitcoin and Ethereum have established smart contracts systems that run under the underlying blockchain technology. To examine the security of the smart contracts. The study revealed that any effort to measure financial performance results to positive results because smart contracts are focused on organization's objectives thus improving financial performance. However, the study failed to relate smart contracts to financial performance effectiveness.

Gunasekaran (2017), introduced various bugs that were made to manipulate the Ethereum smart contacts blockchain for financial benefits. Apparently, it was unveiled that though the system is significantly secure, there exist various gaps with respect to the distributed semantics of the blockchain technology under which the system runs. The authors denoted the need for the enhancement of the Ethereum operational semantics to tighten the security of the system (Luu et al., 2016). The researchers further unveiled the existence of the DAO bug, which makes blockchains vulnerable to DAO exploits; Ethereum cryptocurrency lost more than $60 million in 2016 as a result of this vulnerability (Luu et al., 2016).

On a different point of view, G. W. Peters and Panayi (2016) suggest that the emergence of blockchain technology may disrupt the banking industry in the new future by facilitating digital assets, automated banking ledgers, smart contracts and global money remittance. This

implies that it is high time for business organizations and financial institutions to start considering cryptocurrencies as a mode of payment, and smart contacts and a possible replacement of the traditional business contracts.

Attacks on blockchain systems may be hard to detect and control and hence sufficient security measures must be put in place before rolling them in the banking context (Day, 2017; Zyskind, Nathan, & Pentland, 2015). Business organizations that do not adjust to the prevailing technologies are more often than not caught unaware, and the technology becomes disruptive to their business processes and operations. This study did not consider other factors on firm financial performance measurements including tamper proof contracts and end to end integration. By ignoring to put into account those constructs could not provide the correct results on bank financial performance measurements.

Omohundro (2014) takes a machine learning perspective with respect to smart contracts. The authors argue that the blockchain technology, smart contacts, and cryptocurrencies have resulted in new opportunities for the application of machine learning and artificial intelligence (AI) in general. Zhang, Cecchetti, Croman, Juels, and Shi (2016) argue that the smart contacts can be made smarter, by enhancing their ability to interpreted real- world knowledge and make more reasonable, logical and sound decisions in online commerce.

By integrating AI into smart contracts and cryptocurrencies, it is possible to ensure that the blockchain follows specific safety and measures in order to promote the safety and reliability of the transactions (Back et al., 2014). In these two studies, both researchers did not smart contracts in their research and without knowhow of the users of the information technology, the results would be different.

2.3.3 Operations Visibility and Financial performance of Commercial Banks

Studies on the consequences generally focus on how supply chain visibility affects the flow of goods, cost management, and financial financial performance, and typically document its positive effects. In a departure from the methods in prior research, Swift, Guide, and Muthulingam (2019) develop an innovative measure of SCV tailored for large-sample

archival studies, using the conflict minerals disclosures mandated by the 2010 Dodd-Frank Wall Street Reform and Consumer Protection act.

They document that supply chain visibility is positively associated with profitability, sales financial performance, and stock market valuations. The study revealed that operations visibility results to positive results because its constructs such as verifiable audit trails are focused on organization's objectives thus improving financial performance of commercial banks. However, the study failed to relate constructs such as authenticity and traceability to financial performance of commercial banks.

According to Chava and Purnanandam (2019) knowledge gained through developing supply chain visibility can be leveraged to improve cost management and operational efficiency. For example, firms with higher supply chain visibility are better able to evaluate and switch to more cost-efficient suppliers and to avoid or mitigate the costs of stockouts and excess inventory. To the extent that better cost management or better operating financial performance in general is associated with a lower default risk. The study however generally focused on the broad concept of operations visibility, with no focus on the procurement block chain context. Operations visibility exhibit different features depending on the operations level. To address this, the present study focuses on verifiable audit trails with reference to the operations visibility context.

According to Petersen and Rajan (2017) supply chain visibility is typically a two-way process between suppliers and customers in which customers know more about their suppliers and vice versa. supply chain visibility facilitates supply chain communications, leading to information sharing and knowledge flows in the customer- supplier networks. Suppliers are willing to provide trade credit because they may have an advantage over traditional lenders in investigating their customers' creditworthiness, as well as a better ability to monitor and force repayment of the credit. To the extent that the improved information flows empower the suppliers, supply chain visibility can increase the likelihood that suppliers provide trade credit to their customers. The study found a positive linear

function between operations visibility and bank financial performance. Financial performance leveled off or decreased only when limits of operations visibility ability were reached.

2.3.4 Smart Order Management and Financial performance of Commercial Banks

According to Omohundro (2014) smart order management is using the internet to operate the transactional aspects of requisitioning, authorizing, ordering, receiving and payment processes for the required services or products. The key enabler of the above is the ability of the systems to communicate across organizational boundaries.

A smart order management refers to the use of electronic methods in every stage of the purchasing process from identification of requirements through payment and potentially to contract management. The study however failed to examine smart order management policy, other than playing an independent role, can also play a moderating influence in the relationship between smart order management and firm financial performance, hence the present study

Boer et al., (2020) classified smart order management into six forms that is, e-ordering and e- maintenance repair operate, web-based enterprise resource planning, e-sourcing, e-tendering, e-reverse auctioning/e-auctioning and e-informing. Some of the benefits of adopting smart order management include savings in purchasing transaction cost resulted from less paperwork, less mistakes and more efficient purchasing process .

According to Lysons and Farrington (2016) the characteristics of an smart order management system includes allowing online connectivity with key suppliers; provision for paperless buying**;** electronic generation of requests for quotations and subsequent receipt and analysis of quotations**;** linkage between receipt of customer demand and repeat buying actions; auto-generation of the purchase order; provision of shipping and dispatch data and allows for online payment. This study did not consider other factors on firm financial performance measurements including order validation system and invoice processing system. By ignoring to put into account those constructs could not provide the correct results on bank financial performance measurements.

An Aberdeen report (2018) divides smart order management technologies into three categories: one is indirect procurement which includes the procurement of non- production goods and services such as office supplies, printing, advertising and casual labour; then there is direct procurement which includes the procurement of raw materials, parts and assemblies (that is, organization and management of raw materials, parts and assemblies), and finally sourcing entails identification, evaluation, negotiation of products and supplies for both the indirect and direct supply chain. The study revealed that smart order management results to positive results because its constructs such as request to receipt automation are focused on organization's objectives thus improving financial performance of commercial banks. However, the study failed to relate constructs such as order validation system and invoice processing system to financial performance of commercial banks.

2.4 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Cooper & Schindler, 2021). Conceptual frameworks are used to explain how the independent variables affect the dependent variable. The study uses financial performance of commercial banks as dependent variable and procurement block chain technology as independent variable.

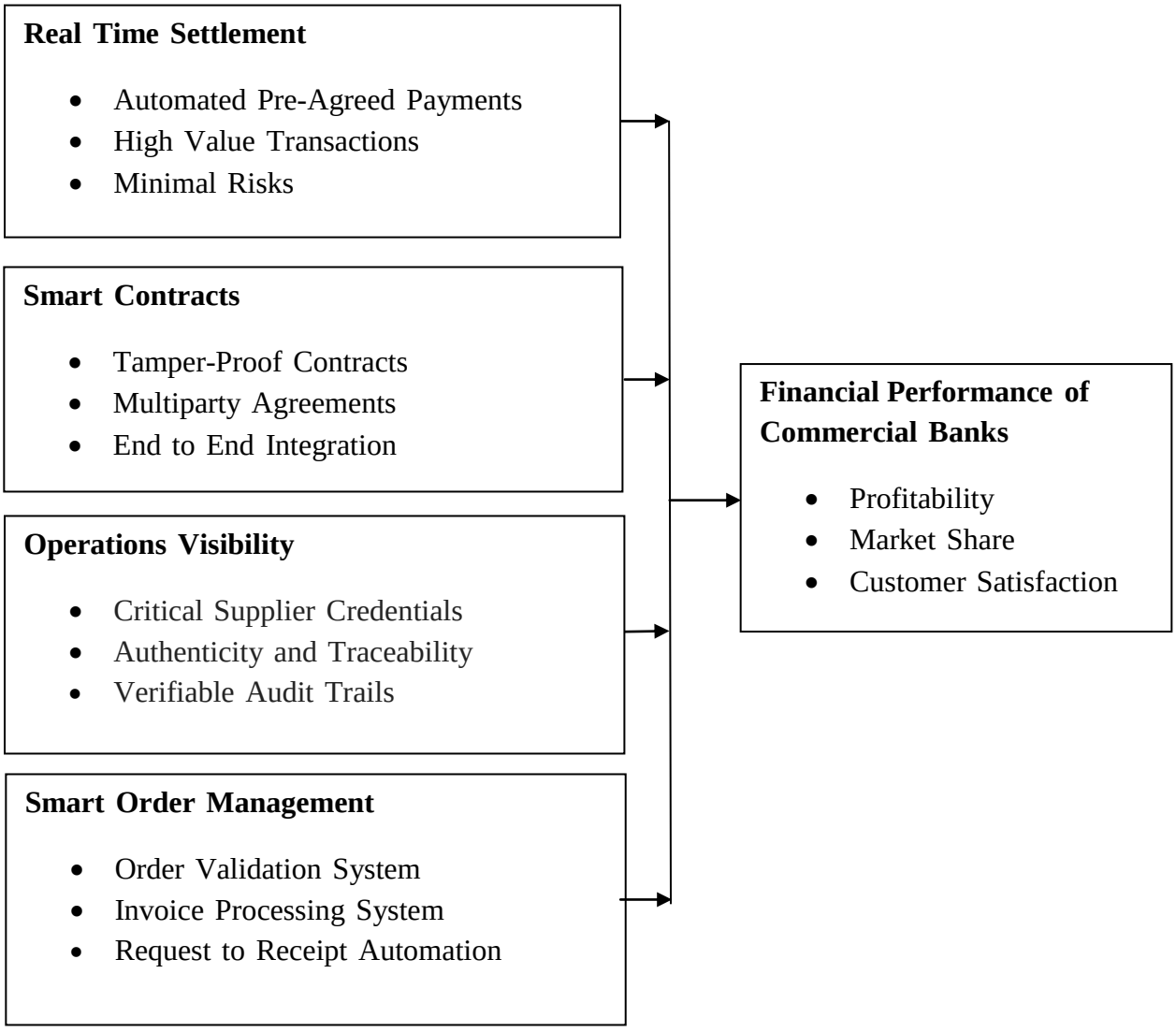

Figure 2.1: Conceptual Framework

2.5 Critique of the Reviewed Literature

From the literature reviewed, it is clear from different authors that traditionally companies have embraced technology in piecemeal style but recently with the onset of procurement block chain technology, change is being noticed in the industry. Wong (2020) suggested that companies should organize the procurement block chain technology function in a way that will maximize its effectiveness and bring commensurate benefits to the company. Some companies are best served by embedding proficient procurement block chain technology professionals in various business units. For others, a more centralized operation is most effective. Many of the progressive companies have, however, have adopted a hybrid approach that combines a centralized strategy to gain consensus with decentralized execution to improve service.

According to Tokar and Williams (2018), procurement block chain technology is a cornerstone of successful supply chain management and thus the whole business. But a collaborative procurement block chain technology initiative produces even better results. Rather than consider procurement block chain technology as just a matter for the purchasing department, best-in-class organizations get internal customers actively involved in the decision-making process. More importantly, they solicit feedback and information regarding their objectives and strategies from those customers, which may include functional areas such as finance and accounting, engineering, operations, maintenance, and quality assurance any internal business unit or function that will contribute to the initiative's success. This approach not only ensures better financial performance but also results in lower total cost, streamlined processes, and increased responsiveness to customers' changing needs.

2.7 Research Gaps

According to Nikosia *et al.,* (2019) financial performance of organisations can be improved with effective procurement block chain technology and there is no single formula to fit all situations. However, a key finding is that, effective procurement block chain technology practices can improve the general financial performance of a company. According to Otto and Kotzab (2020), financial performance, growth and sustainability of firms have strong and reliable relationship with procurement block chain technology practices but enterprises more

specifically financial institutions, have largely not used these practices as far as financial performance goals, structured growth and development of supply chain relationships are concerned. Dominick *et al*. (2020) states that procurement block chain technology can be used to support supply chain management.

The above literature notwithstanding, it is clear that no detailed study has been carried out to specifically determine the role procurement block chain technology variables such as; real time settlement, smart contracts, operations visibility, and smart order management play in financial performance of banks in Kenya. None of those studies carried out so far have focused on procurement block chain technology and its role in financial performance especially in the developing countries and more so the banking industry in Kenya. These constitute the research gaps that this research study will investigate and quantify to understand the influence procurement block chain technology on financial performance of banks in Kenya.

2.7 Summary of Literature Reviewed

Today's marketplace is shifting from individual company financial performance to supply chain financial performance: the entire chain's ability to meet end-customer needs through product availability and responsive, on-time delivery. Effective procurement block chain technology practices will not only reduce the cost of providing goods and services, but it will also offer a number of other important benefits, such as help ensure high availability, increase responsiveness, increase resilience, increase choices and reduce waste (Silver, 2018). Robust and effective procurement block chain technology will relieve the caregivers of the duties and stress associated with concerns about services availability and quality, allowing them to focus on what they do best.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the steps to be followed to completing this study. It involves the collection, measurement and analysis of data. It is broken down to; research design, target population, data collection instruments, data collection procedures and finally data analysis and presentation.

3.2 Research Design

This study adopted a descriptive research design. The choice of this design is appropriate for this study since it utilizes a questionnaire as a tool of data collection and helps to analyze influence of procurement block chain technology on financial performance of banks in Kenya. Descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection. This study therefore generalised the findings on the influence of procurement block chain technology on financial performance of banks as a whole.

3.3 Target Population

According to Ngechu (2019), a population is a well-defined or set of people, services, elements, and events, group of things or households that are being investigated. This definition ensures that population of interest is homogeneous. A collection of observations presenting only a portion of the population is called a sample (Kombo & Tromp, 2019). According to Central Bank of Kenya Directorate (2022) there are 39 commercial banks in Kenya. The target population consisted of commercial banks in Kenya and unit of analysis was the procurement, ICT and finance departments. The unit of observation was 39 heads of procurement, 39 heads of finance and 39 heads of ICT in all banks. The study employed a census approach to collect data from the respondents hence no sampling techniques was used. According to Byaman and bell (2013) a census is a count of all the elements in a population. The respondents were 117 respondents.

Table 3.1 Target Population

Category	Target Population	% of Population
Heads of Procurement	39	33.33
Heads of Finance	39	33.33
Heads of ICT	39	33.33
Total Population	**117**	**100.00**

3.4 Data Collection Instruments

A semi-structured questionnaire were used to collect primary data from respondents and was designed to address the various research objectives. According to Kasomo (2019), a questionnaire is a series of questions on a topic which respondents' opinions are sought. This allowed respondents to extensively respond to topic under study. Questionnaires are easy to analyze, can be mailed to respondents, cost effective, reduced bias because they have uniform question presentation (more objective) and most statistical analysis software can easily process them. The questionnaire was divided into sections; Section one dealt with the general information of the respondent; other sections determined the procurement block chain technology practices exercised by the procurement department and their influence on financial performance of banks.

3.5 Data Collection Procedure

The questionnaire was self-administered to all the respondents, the questionnaire was dropped personally and picked by the researcher after a week to give the respondents adequate time to respond to the questions, telephone follow ups, will further be used to enhance the response rate; The questionnaire was accompanied with an introduction letter. The letter contained an adequate brief about the research under study and will be signed by the research for authenticity.

3.6 Pilot Study

Before the actual study, it was to conduct a pilot study. Oso and Onen (2020) argued that piloting provides opportunity for researchers to test their confidence in identifying shortcomings that may affect the actual collection of useful data. According to Creswell (2020) 10% of the target population should constitute the pilot test which should not be included in final study. Piloting of the research instrument means administering the instrument to a small representative sample identical to but not including the group one is going to survey (Kothari, 2018). This ensures that the questions in the instrument are stated clearly and have the same meaning to all the respondents. According to Mugenda and Mugenda (2018), the respondents on which the questionnaire was pretested, will not be part of the target population of the study. The information obtained during the pre-testing of the questionnaire was used to revise and improve on the questionnaire.

3.6.1 Validity Test

According to Mugenda and Mugenda (2018), validity is the degree to which results obtained from the analysis of the data actually represent, the phenomenon under study. Validity of the instrument is asking the right question framed from the least ambiguous way. Creswell (2020) describes validity as the agreement between the researcher's conclusion and the actual reality. There is construct validity and content validity. Construct validity was ascertained through the data that was collected from the pilot sample to find out whether the data collected was accurate and meaningfully represented in the theoretical concepts. Content validity was analyzed by professionals in the field such as university supervisors. Content validity coefficient index of 0.75 was used to test the validity of the questionnaire (Orodho, 2019). Moreover, to ensure validity of the questionnaires, content validity was established from the pretest and re-test method that was done before the actual research (Denscombe, 2021).

3.6.2 Reliability Test

Reliability is the degree to which scores obtained with an instrument are consistent measures of whatever the instrument measures (Mugenda & Mugenda, 2018). To minimize errors the study used test and retest method in order to test reliability of the research instrument. This

procedure revealed the questions that are vague that can lead to respondents interpreting them differently hence adjustments accordingly. Questions that were not clear or are ambiguous were revised so as to collect the desired information. After piloting, the internal consistency procedure was used to determine the reliability of the instruments. This was determined from scores obtained from a single test administered to a sample of subject. A score obtained in one item will be correlated with scores obtained from other items in the instrument. Finally, Cronbach alpha Reliability coefficient value was computed which yielded an alpha to determine how items correlate among themselves. On the basis of the results of piloting process, the instruments were then be retained or duly modified to meet financial performance standards before being used for data collection (Byaman & Bell, 2021). An alpha coefficient of 0.75 or higher indicates that the gathered data was reliable as it has a relatively high internal consistency and can be generalized to reflect opinions of all respondents in the target population.

3.7 Data Analysis and Presentation

According to Mugenda and Mugenda (2018) data analysis is the process of bringing order, structure and meaning to the mass of data collected. The data collected was coded and entered into a spreadsheet and analyzed using Statistical Package for Social Sciences (SPSS). SPSS version 22 has got descriptive statistics features that assisted in variable response comparison and gave a clear indication of response frequencies (Kothari, 2018).

Once the raw data is collected, the questionnaires were checked for proper recording of the responses and completeness. They were then be coded and the response on each item put into specific categories fitting the research questions. Data was summarized using descriptive distribution of scores or measurements using indices or statistics to describe and compare variables numerically. Descriptive statistics was used to give expected summary statistics of variables being studied in very simple form (Mugenda & Mugenda, 2018). The output was presented in frequency distribution tables which give a record of the number of times a score or a response occurs. The scores were also be presented using percentages to represent data in a pictorial format. The SPSS version 22 offers extensive data handling capabilities

and numerous statistical routines that can analyze small to very large data statistics (Bryman & bell, 2021).

The other type of statistics, inferential statistics were used to give a measure of the relationship between two or more variables and establish if there is any relationship or if there exists a cause effect relationship between the variables (Kothari, 2018). Multiple regression analysis was used to assess the collective effect of the four independent variables (real time settlement, smart contracts, operations visibility and smart order management) on one dependent variable financial performance of banks. Qualitative data analysis method was used to analyze qualitative data gathered using the open-ended questions in the questionnaire. Inferences from analyzed data helped to answer the research questions and also be compared to previous research findings.

The research will use a multiple regression model

$$\mathbf{Y= \beta_0+ \beta_1X_1+\beta_2X_2+\beta_3X_3 +\beta_4X_4 +\mathcal{E}}$$

Where **Y**= Financial performance of Commercial Banks

$\boldsymbol{\beta_0}$= Constant

$\mathbf{X_1}$= Real Time Settlement

$\mathbf{X_2}$=Smart Contracts

$\mathbf{X_3}$= Operations Visibility

$\mathbf{X_4}$=Smart Order Management

$\boldsymbol{\mathcal{E}}$= Error Term

CHAPTER FOUR
DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents results arising from the analysis of data collected using questionnaires. The current study sought to examine the influence of procurement block chain technology on financial performance of commercial banks in Kenya. The data collected was analyzed using descriptive and inferential statistics and the findings presented in tabular summaries and their implications discussed.

4.2 Response Rate

A sample of respondents were interviewed using questionnaires that allowed the researcher to drop the questionnaire to the respondents and then collect them at a later date when they had filled the questionnaires. A total of 117 questionnaires were distributed to respondents. Out of the sample covered, 93 were responsive representing a response rate of 79%. This was above the 50% which is considered adequate in descriptive statistics according to (Kothari, 2019).

Table 4.1: Response Rate of Respondents

Response	Frequency	Percentage
Actual Response	93	79%
Non-Response	24	21%
Total	**117**	**100%**

4.3 Pilot Study

The Cronbach's alpha was computed in terms of the average inter-correlations among the items measuring the concepts. The rule of thumb for Cronbach's alpha is that the closer the alpha is to 1 the higher the reliability (Lysons, 2018). A value of at least 0.7 is recommended. Cronbach's alpha is the most commonly used coefficient of internal consistency and stability. Consistency indicated how well the items measuring the concepts

hang together as a set. Cronbach's alpha was used to measure reliability. This was done on the four objectives of the study. The higher the coefficient, the more reliable is the test.

Table 4.2 Reliability Results

Variable	No of Items	Respondents	α=Alpha	Comment
Real Time Settlement	9	12	0.893	Reliable
Smart Contracts	9	12	0.987	Reliable
Operations Visibility	9	12	0.974	Reliable
Smart Order Management	9	12	0.976	Reliable

4.4 Demographic Information

This section presents the personal details of the respondents and it provides data regarding the study and is necessary for the determination of whether the individuals in a particular study are a representative sample of the target population and testing appropriateness of respondent in answering the questions for generalization. The study sought to determine the demographic characteristics of the respondents as they are considered as categorical variables which give some basic insight about the respondents. The characteristics considered in the study were; gender, their highest level of education attained and their work experience.

4.4.1 Distribution of Respondents by Gender

The study determined the gender distribution of the respondents working for commercial banks in Kenya. The results summarized in the figure below. The result in figure 4.4.1 revealed that majority of the respondent (59%) indicated that they were male, while only (41%) of the respondent indicated that they were female. The percentages may raise the issue of gender equity in commercial banks, but that is outside the scope of this study. A study on Indian organizations found that women and men do not differ in their ability to perform tasks, but rather bring a different perspective to procurement block chain technology through their increased sensitivity to others (Mentzer, 2020).

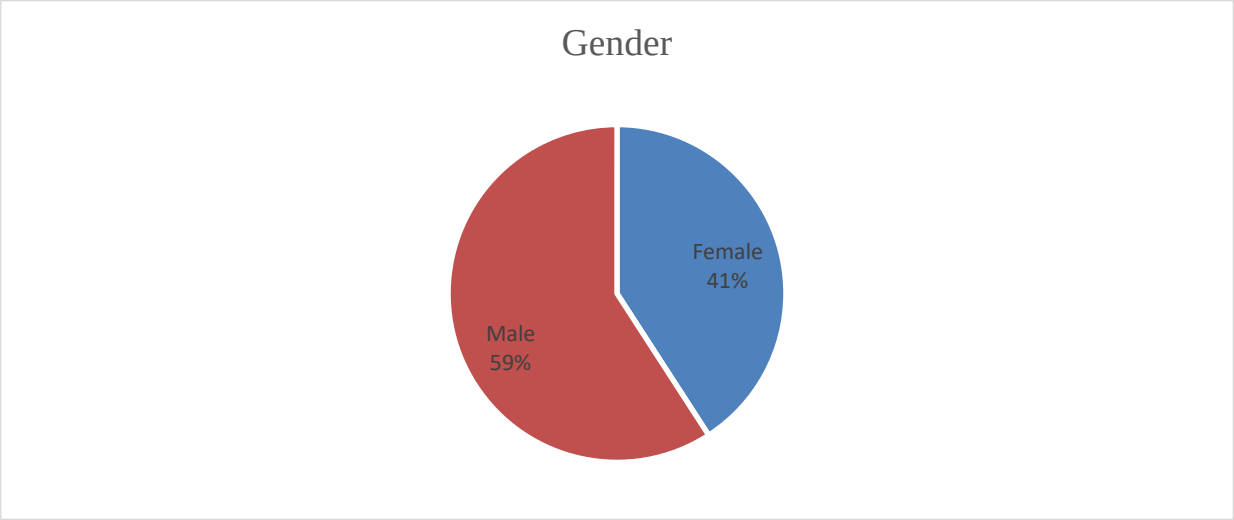

Figure 4.1: Distribution of Respondents by Gender

4.4.2 Distribution of Respondents by Level of Education

The study determined the distribution of the respondents' level of education of employees working commercial banks in Kenya. The results summarized in the table below. The result in table 4.3 revealed that majority of the respondent (55%) had degree level of education and (45%) had master's level of education. These findings concur those of Maina (2021) who established that majority of who work in commercial banks are highly educated and that there is evidence linking education and financial performance in commercial banks.

Table 4.3: Distribution of Respondents by Level of Education

Education Level	Frequency	Percent
Degree Level	51	55
Master Level	42	45
Total	**93**	**100**

4.4.3 Distribution of Respondents by Length of Service

The study determined the number of years the respondents had worked in their current office. The respondents were asked to indicate their work duration. The results revealed that majority of the respondents (40.86%) indicated that their work duration was above 9 years. The result further revealed that (26.88%) of the respondent indicated that their work duration

was 3-5 years and above. The result also showed that (32.25%) of the respondent indicated that their work duration was 6-8 years. The findings of the study are in tandem with literature review by Makau (2019) who indicated that a duration and experience of employee helps him or her to have better knowledge and skills which contribute to financial performance.

Table 4.4: Distribution of Respondents by Length of Service

Length of Service	Frequency	Percent
3-5 Years	25	27
6-8 Years	30	32
9 and above	38	41
Total	**93**	**100**

4.5 Descriptive Statistics

The study set out to examine the examine the influence of procurement block chain technology on financial performance of commercial banks in Kenya. To this end, four variables were conceptualized as components of financial performance of commercial banks in Kenya. These include; real time settlement, smart contracts, operations visibility and smart order management.

4.5.1 Real Time Settlement

The first objective of the study was to assess the influence of real time settlement on financial performance of commercial banks in Kenya. The respondents were asked to indicate to what extent real time settlement influenced financial performance of commercial banks in Kenya. Results indicated that majority of the respondents 33% agreed that it was to a very great extent, 27% said that it was moderate 26% said to a great extent, while little extent and not all were at 8 and 6% respectively.

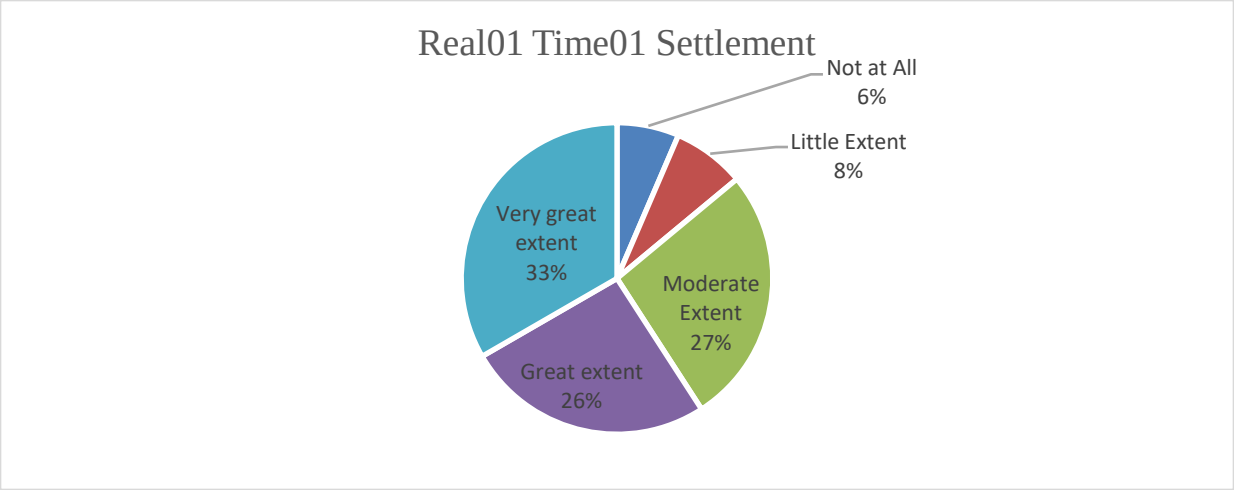

Figure 4.2: Real Time Settlement

The respondents were also asked to comment on statements regarding real time settlement on financial performance of commercial banks in Kenya. The responses were rated on a likert scale and the results presented in Table 4.5 below. It was rated on a 5-point Likert scale ranging from; 1 = strongly disagree to 5 = strongly agree. The scores of 'strongly disagree' and 'disagree' have been taken to represent a statement not agreed upon. The score of 'neutral' has been taken to represent a statement agreed upon. The score of 'agree' and 'strongly agree' have been taken to represent a statement highly agreed upon.

The respondents were asked to indicate the descriptive for real time settlement. The result in table 4.5 revealed that majority of the respondent (89.2%) agreed with the statement that automated pre-agreed payments plays a great role in profitability improvement. The result in table 4.5 revealed that majority of the respondent (93.6%) agreed with the statement that high value transactions play a great role in profitability improvement. The result in table 4.5 also revealed that majority of the respondent (100%) agreed with the statement that minimal risks play a great role in profitability improvement.

Further, the results in table 4.5 revealed that majority of the respondent (89.3%) agreed with the statement that automated pre-agreed payments plays a great role in improving market share. Table 4.5 results also revealed that majority of the respondent (95.7%) agreed with the statement that High value transactions plays a great role in improving market share. The

result in table 4.5 revealed that majority of the respondent (99.6%) agreed with the statement that Minimal risks play a great role in improving market share.

Results in table 4.5 further indicated that majority of the respondent (92.5%) agreed with the statement that Automated pre-agreed payments plays a great role in improving customer satisfaction. Table 4.5 revealed that majority of the respondent (89.2%) agreed with the statement that high value transactions play a great role in improving customer satisfaction. Finally, the results in table 4.5 revealed that majority of the respondent (80.6%) agreed with the statement that minimal risks play a great role in improving customer satisfaction.

The average for the statements on real time settlement was 4.28 indicating that majority of the respondents agreed on statements on real time settlement. The standard deviation showing variations in results was 0.88. The findings agree with Pedersen (2019) that adoption of real time settlement when sourcing for a new product or service can be smart and viable.

Table 4.5: Real Time Settlement

Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree	Mean	Std. Deviation
Automated pre-agreed payments play a great role in profitability improvement	3.20%	4.30%	3.20%	54.80%	34.40%	4.13	0.912
High value transactions play a great role in profitability improvement	3.20%	2.20%	1.10%	32.30%	61.30%	4.46	0.891
Minimal risks play a great role in profitability improvement	0.00%	0.00%	0.00%	45.20%	54.80%	4.55	0.5
Automated pre-agreed payments play a great role in improving market share	4.30%	4.30%	2.20%	39.80%	49.50%	4.26	1.01
High value transactions play a great role in improving market share	1.10%	2.20%	1.10%	47.30%	48.40%	4.4	0.724
Minimal risks play a great role in improving market share	3.20%	2.20%	1.10%	49.50%	44.10%	4.29	0.867
Automated pre-agreed	4.30%	2.20%	1.10%	35.50%	57.00%	4.39	0.956

payments play a great role in improving customer satisfaction							
High value transactions play a great role in improving customer satisfaction	4.30%	5.40%	1.10%	46.20%	43.00%	4.18	1.01
Minimal risks play a great role in improving customer satisfaction	6.50%	6.50%	6.50%	50.50%	30.10%	3.91	1.1
Average						**4.28**	**0.88**

4.5.2 Smart Contracts

The second objective of the study was to establish the influence of smart contracts on financial performance of commercial banks in Kenya. The respondents were asked to indicate to what extent smart contracts influenced financial performance of commercial banks in Kenya. Results indicated that majority of the respondents 32% agreed that it was to a very great extent, 36% said that it was to a great extent, 21% said it was moderate, while little extent was at 6% and not all at 5%.

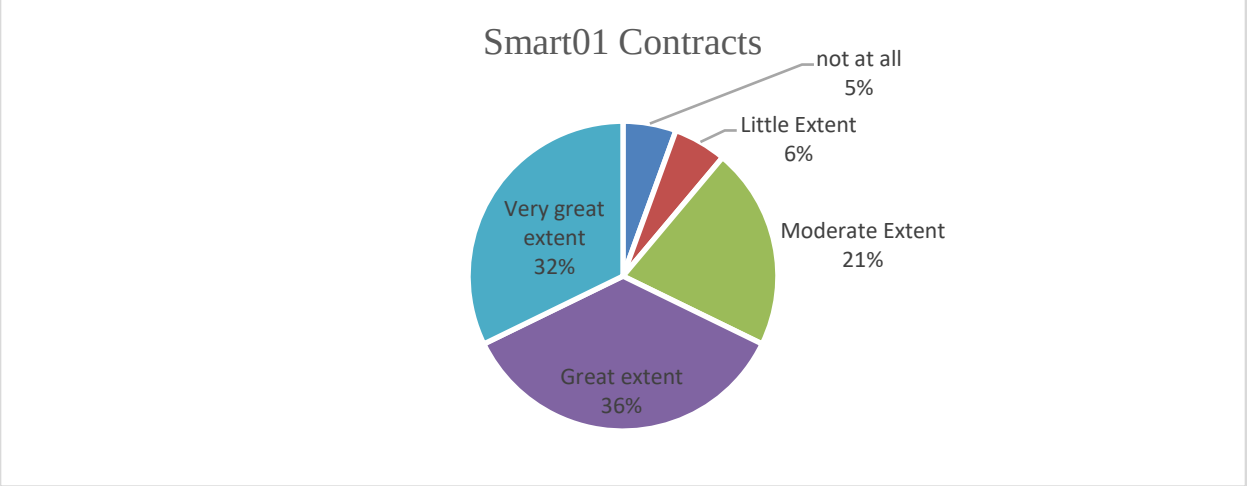

Figure 4.3: Smart Contracts

The respondents were also asked to comment on statements regarding smart contracts on financial performance of commercial banks in Kenya. The respondents were asked to indicate descriptive responses for smart contracts. The result in table 4.6 revealed that majority of the respondents (60.2%) indicated that they agreed with the statement that

tamper-proof contracts play a great role in profitability improvement. The result further revealed that majority of the respondents (57%) indicated that they agreed with the statements that multiparty agreements play a great role in profitability improvement. The result revealed that majority of the respondents (53.8%) indicated that they agreed with the statement that end-to-end integration play a great role in profitability improvement.

The result further revealed that majority of the respondents (57%) indicated that they agreed with the statement that tamper-proof contracts play a great role in improving market share. The result revealed that majority of the respondents (58.1%) indicated that they agreed with the statement that multiparty agreements play a great role in improving market share. The result further revealed that majority of the respondents (48.4%) indicated that they disagreed with the statement that end-to-end integration play a great role in improving market share.

The result revealed that majority of the respondents (71%) indicated that they agreed with the statement that tamper-proof contracts play a great role in improving customer satisfaction. The result further revealed that majority of the respondents (51.6%) indicated that they agreed with the statement that Multiparty agreements play a great role in improving customer satisfaction. The result revealed that majority of the respondents (57%) indicated that they agreed with the statement that end-to-end integration play a great role in improving customer satisfaction.

The average for the statements on smart contracts was 3.67. These findings agree with Odundo (2021) that organizations must look toward smart contracts improvements. The opportunities for cost savings and operations improvements can be enormous as the impact on margins and bottom line is considerable.

Table 4.6: Smart Contracts

Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree	Mean	Std. Deviation
Tamper-proof contracts play a great role in profitability improvement	6.50%	5.40%	28.00%	43.00%	17.20%	3.59	1.045
Multiparty agreements play a great role in profitability improvement	0.00%	7.50%	35.50%	35.50%	21.50%	3.71	0.892
End to end integration play a great role in profitability improvement	1.10%	0.00%	45.20%	44.10%	9.70%	3.61	0.708
Tamper-proof contracts play a great role in improving market share	6.50%	5.40%	31.20%	36.60%	20.40%	3.59	1.076
Multiparty agreements play a great role in improving market share	3.20%	3.20%	35.50%	44.10%	14.00%	3.62	0.884
End to end integration play a great role in improving market share	0.00%	0.00%	51.60%	39.80%	8.60%	3.57	0.649
Tamper-proof contracts play a great role in improving customer satisfaction	0.00%	0.00%	29.00%	25.80%	45.20%	4.16	0.851
Multiparty agreements play a great role in improving customer satisfaction	3.20%	0.00%	45.20%	37.60%	14.00%	3.59	0.85
End to end integration play a great role in improving customer satisfaction	4.30%	4.30%	34.40%	36.60%	20.40%	3.65	0.996
Average						**3.67**	**0.88**

4.5.3 Operations Visibility

There was also need to establish influence of operations visibility on financial performance of commercial banks in Kenya. The respondents were asked to comment on extent of influence of operations visibility on financial performance of commercial banks in Kenya. Results indicated that majority of the respondents 46% agreed that it was to a great extent, 42% said that it was to a very great extent, 6% said it was moderate; little extent was 3% and not all at 3%.

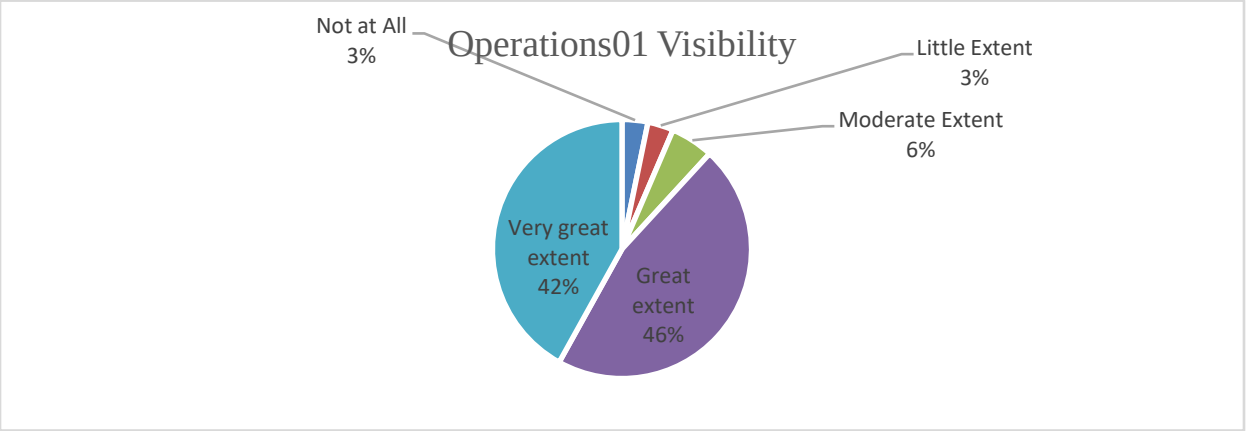

Figure 4.4: Operations Visibility

The respondents were asked to indicate their levels of agreement on statements regarding operations visibility. The result in table 4.7 revealed that majority of the respondent (58.1%) agreed with the statement that critical supplier credentials play a great role in profitability improvement. The result further revealed that majority of the respondent (91.4%) agreed with the statement that authenticity and traceability play a great role in profitability improvement. The result revealed that majority of the respondent (49.5%) agreed with the statement that verifiable audit trails play a great role in profitability improvement.

The result further revealed that majority of the respondent (47.3%) agreed with the statement that critical supplier credentials play a great role in improving market share. The result revealed that majority of the respondent (61.3%) agreed with the statement that authenticity and traceability play a great role in improving market share. The result further revealed that

majority of the respondent (65.6%) agreed with the statement that verifiable audit trails play a great role in improving market share.

The result revealed that majority of the respondent (64.5%) agreed with the statement that critical supplier credentials play a great role in improving customer satisfaction. The result further revealed that majority of the respondent (64.5%) agreed with the statement that authenticity and traceability play a great role in improving customer satisfaction. The result revealed that majority of the respondent (68.8%) agreed with the statement that verifiable audit trails play a great role in improving customer satisfaction.

The average for the statements on operations visibility was 3.89. These findings imply that through operations visibility adoption, banks can improve competitive positioning, gain entry to new dynamic, technology driven markets, supplement critical skills and share the risk (Davila, 2019).

Table 4.7: Operations Visibility

Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree	Mean	Std. Deviation
Critical supplier credentials play a great role in profitability improvement	4.30%	2.20%	35.50%	30.10%	28.00%	3.75	1.028
Authenticity and traceability play a great role in profitability improvement	0.00%	2.20%	3.20%	45.20%	46.20%	4.48	0.816
Verifiable audit trails play a great role in profitability improvement	6.50%	22.60%	21.50%	23.70%	25.80%	3.4	1.27
Critical supplier credentials play a great role in improving market share	0.00%	20.40%	32.30%	18.30%	29.00%	3.56	1.118
Authenticity and traceability play a great role in improving market	0.00%	1.10%	37.60%	22.60%	38.70%	3.99	0.903

share							
Verifiable audit trails play a great role in improving market share	0.00%	0.00%	34.40%	34.40%	31.20%	3.97	0.814
Critical supplier credentials play a great role in improving customer satisfaction	2.20%	1.10%	32.30%	25.80%	38.70%	3.98	0.978
Authenticity and traceability play a great role in improving customer satisfaction	0.00%	0.00%	35.50%	31.20%	33.30%	3.98	0.834
Verifiable audit trails play a great role in improving customer satisfaction	1.10%	2.20%	28.00%	35.50%	33.30%	3.98	0.897
Average						**3.89**	**0.962**

4.5.4 Smart Order Management

There was also need to establish the influence of smart order management on financial performance of commercial banks in Kenya. The respondents were also asked to comment on statements regarding smart order management on financial performance of commercial banks in Kenya. Results also showed that 3% of respondents indicated to very great extent, great extent was at %, moderate extent was 31%, while little extent was at 32% and not at all was at 23%.

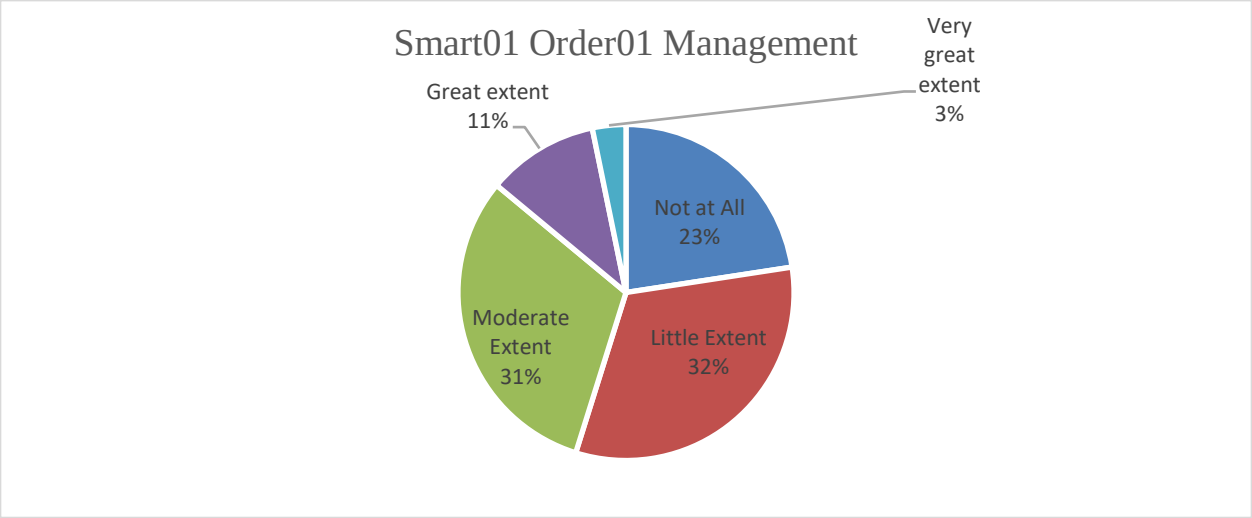

Figure 4.5: Smart Order Management

The respondents were asked to indicate the descriptive for smart order management. The result in table 4.8 revealed that majority of the respondent (100%) agreed with the statement that order validation system plays a great role in profitability improvement. The result further revealed that majority of the respondent (70.9%) agreed with the statement that invoice processing system plays a great role in profitability improvement. The result revealed that majority of the respondent (48.4%) disagreed with the statement that request to receipt automation plays a great role in profitability improvement.

The result further revealed that majority of the respondent (100%) agreed with the statement that Order validation system plays a great role in improving market share. The result revealed that majority of the respondent (96.8%) agreed with the statement that invoice processing system plays a great role in improving market share. The result further revealed that majority of the respondent (92.5%) agreed with the statement that request to receipt automation plays a great role in improving market share.

The result further revealed that majority of the respondent (90.3%) agreed with the statement that order validation system plays a great role in improving customer satisfaction. The result further revealed that majority of the respondent (89.2%) agreed with the statement that invoice processing system plays a great role in improving customer satisfaction. The result further revealed that majority of the respondent (88.1%) agreed with the statement that request to receipt automation plays a great role in improving customer satisfaction.

The average for the statements on smart order management was 4.15. The results imply that an organization benefits greatly when smart order management are embraced to reduce unnecessary costs, Nyariki (2021) opines that this can be designed to address the organization’s needs, and work with the organization to streamline operations.

Table 4.8: Smart Order Management

Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree	Mean	Std. Deviation
Order validation system plays a great role in profitability improvement	0.00%	0.00%	0.00%	55.90%	44.10%	4.44	0.499
Invoice processing system plays a great role in profitability improvement	0.00%	0.00%	29.00%	29.00%	41.90%	4.13	0.837
Request to receipt automation plays a great role in profitability improvement	23.70%	24.70%	10.80%	18.30%	22.60%	2.91	1.516
Order validation system plays a great role in improving market share	0.00%	0.00%	0.00%	48.40%	51.60%	4.52	0.502
Invoice processing system plays a great role in improving market share	0.00%	3.20%	0.00%	44.10%	52.70%	4.46	0.669
Request to receipt automation plays a great role in improving market share	4.30%	0.00%	3.20%	38.70%	53.80%	4.38	0.908
Order validation system plays a great role in improving customer satisfaction	0.00%	3.20%	6.50%	44.10%	46.20%	4.33	0.742
Invoice processing system plays a great role in improving customer satisfaction	6.50%	0.00%	4.30%	55.90%	33.30%	4.1	0.979
Request to receipt automation plays a great role in improving customer satisfaction	6.50%	4.30%	1.10%	46.20%	41.90%	4.13	1.086
Average						**4.15**	**0.85**

4.6 Correlation Analysis

Correlation analysis was used to determine both the significance and degree of association of the variables and also predict the level of variation in the dependent variable caused by the independent variables.

Table 4.9: Summary of Pearson's Correlations

Correlations		Real Time Settlement	Smart Contracts	Operations Visibility	Smart Order Management	Financial performance of Commercial Banks
Real Time Settlement	Pearson Correlation	1				
Smart Contracts	Pearson Correlation	.744**	1			
	Sig. (2-tailed)	0				
Operations Visibility	Pearson Correlation	.692**	.796**	1		
	Sig. (2-tailed)	0	0			
Smart Order Management	Pearson Correlation	.650**	.760**	.930**	1	
	Sig. (2-tailed)	0	0	0		
Financial performance of Commercial Banks	Pearson Correlation	748**	.883**	.801**	.801**	1
	Sig. (2-tailed)	0	0	0	0	

** Correlation is significant at the 0.05 level (2-tailed).

The correlation summary shown in Table 4.9 indicates that the associations between each of the independent variables and the dependent variable were all significant at the 95% confidence level. The correlation analysis to determine the relationship between real time settlement and financial performance of commercial banks in Kenya, Pearson correlation coefficient computed and tested at 5% significance level. The results indicate that there is a

positive relationship (r=0.748) between real time settlement and financial performance of commercial banks in Kenya. In addition, the researcher found the relationship to be statistically significant at 5% level (p=0.000, <0.05).

The correlation analysis to determine the relationship between smart contracts and financial performance of commercial banks in Kenya, Pearson correlation coefficient computed and tested at 5% significance level. The results indicate that there is a positive relationship (r=0.883) between smart contracts and financial performance of commercial banks in Kenya. In addition, the researcher found the relationship to be statistically significant at 5% level (p=0.000, <0.05).

The correlation analysis to determine the relationship between of operations visibility on financial performance of commercial banks in Kenya, Pearson correlation coefficient computed and tested at 5% significance level. The results indicate that there is a positive relationship (r=0.801) between of operations visibility and financial performance of commercial banks in Kenya. In addition, the researcher found the relationship to be statistically significant at 5% level (p=0.000, <0.05).

The correlation analysis to determine the relationship between smart order management and financial performance of commercial banks in Kenya, Pearson correlation coefficient computed and tested at 5% significance level. The results indicate that there is a positive relationship (r=0.801) between smart order management and financial performance of commercial banks in Kenya. In addition, the researcher found the relationship to be statistically significant at 5% level (p=0.000, <0.05). Hence, it is evident that all the independent variables could explain the changes in the financial performance of commercial banks in Kenya, on the basis of the correlation analysis.

4.7 Regression Analysis

In this study multivariate regression analysis was used to determine the significance of the relationship between the dependent variable and all the independent variables pooled together. Regression analysis was conducted to find the proportion in the dependent variable

(financial performance of commercial banks in Kenya) which can be predicted from the independent variables (real time settlement, smart contracts, operations visibility and smart order management). Table 4.10 presents the regression coefficient of independent variables against dependent variable. The results of regression analysis revealed there is a significant positive relationship between dependent variable and the independent variable.

The independent variables reported R value of 0.911 indicating that there is perfect relationship between dependent variable and independent variables. R square value of 0.83means that 83% of the corresponding variation in financial performance of commercial banks in Kenya can be explained or predicted by (real time settlement, smart contracts, operations visibility and smart order management) which indicated that the model fitted the study data.

Adjusted R square in table 4.10 is called the coefficient of determination which indicates how financial performance of commercial banks in Kenya varied with variation in effects of factors which includes; real time settlement, smart contracts, operations visibility and smart order management. The results of regression analysis revealed that there was a significant positive relationship between dependent variable and independent variable at ($\beta = 0.83$), $p=0.000 <0.05$).

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.911[a]	.83	.822	.113999

a) Predictors: (Constant), Smart Order Management, Real Time Settlement, Smart Contracts and Operations Visibility
b) Dependent Variable: Financial performance of Commercial Banks

Table 4.11: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.591	4	1.398	107.558	.000[b]
	Residual	1.144	88	0.013		
	Total	6.735	92			

a) Predictors: (Constant), Smart Order Management, Real Time Settlement, Smart Contracts and Operations Visibility
b) Dependent Variable: Financial performance of Commercial Banks

The significance value is 0.000 which is less that 0.05 thus the model is statistically significance in predicting how real time settlement, smart contracts, operations visibility and smart order management influence financial performance of commercial banks in Kenya. The F critical at 5% level of significance was 67.08. Since F calculated which can be noted from the ANOVA table above is 107.558 which is greater than the F critical (value = 67.08), this shows that the overall model was significant. The study therefore establishes that real time settlement, smart contracts, operations visibility and smart order management were all important factors influencing financial performance of commercial banks. These results agree with Makau (2014) results which indicated a positive and significant influence of procurement block chain technology on financial performance of commercial banks.

Table 4.12: Coefficients of Determination

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.621	0.262		2.375	0.020
	Smart Contracts	0.496	0.070	0.572	7.085	0.000
	Smart Order Management	0.194	0.071	0.326	2.732	0.000
	Real Time Settlement	0.178	0.078	0.155	2.281	0.025

Operations Visibility	0.032	0.064	0.064	0.495	0.004

a) Predictors: (Constant), Smart Order Management, Real Time Settlement, Smart Contracts and Operations Visibility
b) Dependent Variable: Financial performance of Commercial Banks

The research used a multiple regression model

$$\mathbf{Y= \beta_0+ \beta_1X_1+\beta_2X_2+\beta_3X_3 +\beta_4X_4 +Ɛ}$$

Where **Y**= Financial performance of Commercial Banks

$\mathbf{B_0}$= Constant

$\mathbf{X_1}$= Real Time Settlement

$\mathbf{X_2}$= Smart Contracts

$\mathbf{X_3}$= Operations Visibility

$\mathbf{X_4}$= Smart Order Management

Ɛ= Error Term at 95% Confidence Level.

The regression equation will be;

$$\mathbf{Y = 0.621+ 0.178X_1 + 0.496X_2 + 0.032X_3 +0.194X_4}$$

The regression equation above has established that taking all factors into account (real time settlement, smart contracts, operations visibility and smart order management) constant at zero, financial performance of commercial banks in Kenya will be an index of 0.621.

The study also found that a unit increase in real time settlement will lead to a 0.178 increase in financial performance of commercial banks in Kenya. The P-value was 0.025 and thus the relationship was significant. The study also found that a unit increase in smart contracts will lead to a 0.496 increase in financial performance of commercial banks in Kenya. The P-value was 0.00 and thus the relationship was significant.

In addition, the study found that a unit increase in operations visibility will lead to a 0.032 increase in the financial performance of commercial banks in Kenya. The P-value was 0.004

and thus the relationship was significant. Lastly, the study found that a unit increase in smart order management will lead to a 0.194 increase in the financial performance of commercial banks in Kenya. The P-value was 0.008 and hence the relationship was significant since the p-value was lower than 0.05. The findings of the study show that, smart contracts contributed most to the financial performance of commercial banks in Kenya.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a detailed summary of the major findings of the actual study; it then draws conclusions and discusses implications emanating from these findings. Finally, it makes some recommendations and suggestions on areas of further study. The main aim of the study was to study the influence of procurement block chain technology on financial performance of commercial banks in Kenya. It specifically sought to determine the influence of; real time settlement, smart contracts, operations visibility and smart order management in the commercial banks.

5.2 Summary of Findings

The study sought to examine the influence of procurement block chain technology on financial performance of commercial banks in Kenya. The study targeted staff of commercial banks, specifically finance, procurement and ICT departments. A total of 93 respondents participated. The summary of the study findings presented herein followed the research objectives formulated in chapter one of the study.

5.2.1 Real Time Settlement

The study sought to assess influence of real time settlement on financial performance of commercial banks as the first objective of the study. A majority of respondents were found to highly agree that the commercial banks had embraced real time settlement with regard to their procurement activities. Automated pre-agreed payments policy was common in the commercial banks. Correlation and regression results revealed that this was an important variable that could perhaps be explained by the observation from the findings that real time settlement was an important factor in influencing financial performance of commercial banks.

5.2.2 Smart Contracts

The influence of smart contracts on financial performance of commercial banks was the second objective of the study. A majority of respondents were found to highly agree that the

commercial banks had improved smart contracts with regard to their procurement activities. Multiparty agreements were common in the commercial banks. Correlation and regression results revealed that this was an important variable that could perhaps be explained by the observation from the findings that smart contracts were an important factor in influencing financial performance of commercial banks.

5.2.3 Operations Visibility

The study endeared to assess influence of operations visibility on financial performance of commercial banks as the third objective of the study. A majority of respondents were found to highly agree that the commercial banks had embraced operations visibility with regard to their procurement activities. Critical supplier credentials and verifiable audit trails were common in the commercial banks. Correlation and regression results revealed that this was an important variable that could perhaps be explained by the observation from the findings that operations visibility was an important factor in influencing financial performance of commercial banks.

5.2.4 Smart Order Management

The study sought to assess influence of smart order management on financial performance of commercial banks as the last objective of the study. A majority of respondents were found to highly agree that the commercial banks had embraced smart order management with regard to their procurement activities. Order validation system and request to receipt automation were common in the commercial banks. Correlation and regression results revealed that this was an important variable that could perhaps be explained by the observation from the findings that smart order management was an important factor in influencing financial performance of commercial banks.

5.2.5 Financial performance of Commercial Banks

The study endeared to determine influence of procurement block chain technology on financial performance with reference to commercial banks in Kenya. The regression results revealed that procurement block chain technology issues identified in the study, that is, real time settlement, smart contracts, operations visibility and smart order management combined

could explain approximately 83% of the variations in the financial performance of commercial banks. The other 17% may be attributed to other issues not explained by the model or the variables.

Profitability recorded a positive growth, market share and customer satisfaction further recorded positive growth, cost reductions due to minimal repeat procurement process also recorded positive growth. From inferential statistics, a positive correlation is seen between each predictor variable and financial performance of commercial banks. The strongest correlation was established between smart contracts and financial performance of commercial banks. All the independent variables were found to have a statistically significant association with the dependent variable at ninety five percent level of confidence.

5.3 Conclusions of the Study

Based on the study findings, the study concludes that financial performance of commercial banks can be improved by real time settlement, smart contracts, operations visibility and smart order management. First, in regard to real time settlement, the regression coefficients of the study show that it has a significant influence of 0.178 on commercial banks. This implies that increasing levels of real time settlement by a unit would increase the levels of financial performance of the commercial banks by 0.178. This shows that real time settlement has a positive influence on commercial banks.

Second in regard to smart contracts, the regression coefficients of the study show that it has a significant influence of 0.496 on financial performance of commercial banks. This implies that increasing levels of smart contracts by a unit would increase the levels of financial performance of commercial banks by 0.496. This shows that smart contracts have a positive influence on financial performance of commercial banks.

With regard to operations visibility, the regression coefficients of the study show that it has a significant influence of 0.032 on financial performance of commercial banks. This implies that increasing levels of operations visibility by a unit would increase the levels of financial

performance of commercial banks by 0.032. This shows that operations visibility has a positive influence on financial performance of commercial banks.

Lastly, in regard to the fourth objective, the regression coefficients of the study show that it has a significant influence of 0.194 on financial performance of commercial banks. This implies that increasing levels of smart order management by a unit would increase the levels of financial performance of the commercial banks by 0.194. This shows that smart order management have a positive influence on financial performance of commercial banks.

Drawing on this research, lack of real time settlement, smart contracts, operations visibility and smart order management in commercial banks is leading to poor financial performance. Though the commercial banks are striving hard to improve their financial performance there are still issues of low-quality products, long lead time and high cost of products. It was articulated that the current phenomenon of poor financial performance in the commercial banks can be reversed if they ensure real time settlement, smart contracts, operations visibility and smart order management are embraced in the procurement function. Thus, it is evident that all the independent variables identified in this study were all important procurement block chain technology issues that influenced the financial performance of commercial banks.

5.4 Recommendations of the Study

5.4.1 Real Time Settlement

To ensure that commercial banks have better financial performance they should focus more on adhering to real time settlement so as to ascertain the realistic procurement cycle attainable by vendors, their realistic technical capacity and ensure that there is consistency of quality in goods supplied. In the same regard, they should involve suppliers early enough to enable them to come up with risk mitigating strategies that articulate with their organizational goals.

5.4.2 Smart Contracts

With regard to the second objective, it would be constructive for commercial banks to invest more in tamper-proof systems to reduce the cost of procurement through unnecessary reworks and ensure professional employees get it right the first time. This should be done consistently with the partnerships, training and capacity building.

5.4.3 Operations Visibility

In relation to operations visibility, the organizations should form strategic technological alliances with their vendors so as to have a more improved working relationship characterized by critical supplier credentials and verifiable audit trails. If commercial banks embrace authenticity and traceability for its suppliers then there will be cost reduction and timing of delivery will improve.

5.4.4 Smart Order Management

Concerning smart order management, there is need for commercial banks to always set aside a substantial part of their resources for activities that influence its core operations. This is because decisions made here have major effects on the bank's sustainability in the market. The study recommends that procurement, ICT and finance staff in the commercial banks should embrace procurement block chain technology to ensure that goods supplied are of the right quality, in the right quantity, at the right time, to the right place from the right source. More checks and controls should be introduced to check on the integrity of the sourcing systems.

5.5 Areas for Further Research

The study is a milestone for further research in the field of financial performance of commercial banks in Africa and particularly in Kenya. The findings demonstrated the important procurement block chain technology issues relating to financial performance of commercial banks. The current study obtained an R^2 of 83% and should therefore be expanded further in future in order to include other procurement block chain technology tools that may as well have a positive significance to financial performance of commercial banks. Existing literature indicates that as a future avenue of research, there is need to

undertake similar research in other institutions in Kenya and other countries in order to establish whether the explored procurement block chain technology tools herein can be generalized to influence financial performance in other institutions.

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APPENDICES

Appendix I: Introduction Letter

Dear Respondent,

I am a student at KCA University pursuing a graduate degree in Masters of Business Administration in Procurement and Supplies Management. I am conducting research on the influence of procurement block chain technology on financial performance of banks in Kenya. The results of this survey will be used for academic purposes only and shall be treated with utmost confidence and anonymity.

Your assistance in filling this questionnaire is highly appreciated.

Thank You.

Yours Faithfully,

Christine P. Auma

Appendix II: Questionnaire

This questionnaire has been set in relation to the objectives of the study. all the questions relate to influence of procurement block chain technology on financial performance of commercial banks. Kindly read the questions carefully and answer them as honestly as possible by ticking (✓), rating, specifying or writing the correct answers precisely on the spaces provided.

SECTION 1: RESPONDENT'S INFORMATION

1. Department of the person filling the questionnaire _____

2. Gender (Please tick in the appropriate box)
   i) Male [ ]
   ii) Female [ ]

3. What is your age? (Please tick in the appropriate box)
   i) 31-40 [ ]
   ii) 41-50 [ ]
   iii) 50 and above [ ]

4. What is your level of education? (Please tick in the appropriate box)
   i) Degree level [ ]
   ii) Master level [ ]

5. Number of years served in your current office
   i) 3-5 [ ]
   ii) 6-8 [ ]
   iii) 9 and above [ ]

SECTION 2: Real Time Settlement

7. How would you rate the real time settlement systems implemented in your department?

a) Very Effective

b) Effective

c) Somehow Effective

d) Ineffective

8. **Please indicate the extent to which you agree or disagree with the following statements on the influence of real time settlement on financial performance of banks. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly agree").**

		1	**2**	**3**	**4**	**5**
a)	Automated pre-agreed payments play a significant role in profitability improvement					
b)	The capacity to do high value transactions play a significant role in profitability improvement					
c)	Minimising risks play a significant role in profitability improvement					
d)	Automated pre-agreed payments play a significant role in expanding market share					
e)	The capacity to do high value transactions play a significant role in expanding market share					

f)	Minimising risks play a significant role in expanding market share					
g)	Automated pre-agreed payments play a significant role in attaining higher customer satisfaction					
h)	The capacity to do high value transactions play a significant role in attaining higher customer satisfaction					
i)	Minimising risks play a significant role in attaining higher customer satisfaction					

SECTION 3: Smart Contracts

11. How would you rate the smart contracts implemented in your department?

a) Very Effective

b) Effective

c) Somehow Effective

d) Ineffective

12**. Please indicate the extent to which you agree or disagree with the following statements on the influence of smart contracts on financial performance of banks. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly agree").**

		1	**2**	**3**	**4**	**5**
a)	Tamper-proof contracts play a significant role in profitability improvement					

b)	Multiparty agreements play a significant role in profitability improvement					
c)	End to end integration plays asignificant role in profitability improvement					
d)	Tamper-proof contracts play a significant role in expanding market share					
e)	Multiparty agreements play a significant role in expanding market share					
f)	End to end integration plays asignificant role in expanding market share					
g)	Tamper-proof contracts play a significant role in attaining higher customer satisfaction					
h)	Multiparty agreements play a significant role in attaining higher customer satisfaction					
i)	End to end integration plays a significant role in attaining higher customer satisfaction					

SECTION 4: Operations Visibility

15. How would you rate the operations visibility structure implemented in your department?

a) Very Effective

b) Effective

c) Somehow Effective

d) Ineffective

16. **Please indicate the extent to which you agree or disagree with the following statements on the influence of operations visibility on financial performance of banks. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly agree").**

		1	**2**	**3**	**4**	**5**
a)	Critical supplier credentials play a significant role in profitability improvement					
b)	Authenticity and traceability plays a significant role in profitability improvement					
c)	Verifiable audit trails play a significant role in profitability improvement					
d)	Critical supplier credentials play a significant role in expanding market share					
e)	Authenticity and traceability plays a significant role in expanding market share					
f)	Verifiable audit trails play a significant role in expanding market share					
g)	Critical supplier credentials play a significant role in attaining higher customer satisfaction					
h)	Authenticity and traceability plays a significant role in attaining higher customer satisfaction					

i)	Verifiable audit trails play a significant role in attaining higher customer satisfaction					

SECTION 5: Smart Order Management

19. How would you rate the smart order management implemented in your department?

a) Very Effective

b) Effective

c) Somehow Effective

d) Ineffective

20. **Please indicate the extent to which you agree or disagree with the following statements on the influence of smart order management on financial performance of banks. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly agree").**

		1	**2**	**3**	**4**	**5**
a)	Order validation system plays a significant role in profitability improvement					
b)	Invoice processing system plays asignificant role in profitability improvement					
c)	Request to receipt automation plays asignificant role in profitability improvement					
d)	Order validation system plays a significant role in expanding market share					

e)	Invoice processing system plays a significant role in expanding market share					
f)	Request to receipt automation plays a significant role in expanding market share					
g)	Order validation system plays a significant role in attaining higher customer satisfaction					
h)	Invoice processing system plays a significant role in attaining higher customer satisfaction					
i)	Request to receipt automation plays a significant role in attaining higher customer satisfaction					

SECTION 6: Financial performance of Commercial Banks

(Please indicate by ticking the margin of profitability improvement over the last five years)

23. Profitability

Category	2017	2018	2019	2020	2021
Percentage (%)					
0-5					
5-10					
10-15					
15-20					
Over 20					

(Please indicate by ticking the margin of market share attained over the last five years)

24. Market Share

Category	2017	2018	2019	2020	2021
Market Share Percentage (%)					
0-5					
5-10					
10-15					
15-20					
Over 20					

(Please indicate by ticking the margin of customer satisfaction as indicated by both internal and external surveys done over the last five years)

25. Customer Satisfaction

Category	**2017**	**2018**	**2019**	**2020**	**2021**
Customer Satisfaction					
Percentage (%)					
0-5					
5-10					
10-15					
15-20					
Over 20					

THANK YOU FOR YOUR TIME

THANK YOU FOR YOUR TIME