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Effect of fraud risk management practices on level of activity by agent banks in Nairobi County

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EFFECT OF FRAUD RISK MANAGEMENT PRACTICES ON LEVEL OF ACTIVITY BY AGENT BANKS IN NAIROBI COUNTY.

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Karanja Norah Nyokabi (66790)

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DEDICATION

This thesis is dedicated to the Karanjas', Francis and Elvis. It is written in memory of my late brother Arch. George K Karanja.

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ABBREVIATIONS AND ACRONYMS

AB	Agency Banking
ACFE	Association of Certified Fraud Examiners
CBK	Central Bank of Kenya
CGAP	the Consultative Group to Assist the Poor
CGMA	Chartered Global Management Accountant
COSO	Committee of Sponsoring Organizations
DFS	Digital Financial Services
FDT	Fraud Diamond Theory
FRM	Fraud Risk Management
FPT	Fraud Pentagon Theory
FSD	Financial Sector Deepening
FTT	Fraud Triangle Theory
ROA	Return on Assets
ROE	Return on Equity
SME	Small and Medium Enterprise

DEFINITION OF TERMS

Agent is a third party acting on behalf of a principal**,** and herein means an entity that has been contracted by an institution and having been approved by the Central Bank to provide the services of the institution on behalf of the institution in the manner specified in the CBK Guideline (CBK, 2016).

Agency banking is a partnership with non-banks, and can be any business ranging from grocery stores, lottery kiosks, pharmacies, and post offices acting as distribution outlets for financial services (Kumar et al; 2006). Agency banking takes services to the convenience of consumers, by reducing transport costs.

Financial inclusion is defined as the process of having and ensuring access to financial services which are timely, affordable and adequate to the vulnerable groups like the low income earners. "Financial inclusion means universal access, at a reasonable cost to a wide range of financial services" (Mugo & Kilonzo, 2017).

Fraud is defined as an act involving intentional deceit and attempted concealment to gain an advantage. Occupational fraud is where an employee uses their occupation and position for personal enrichment by deliberately misusing the organizational resources (ACFE, 2006).

Fraud risk Management is a process of understanding, recognizing and dealing with fraud risks that an organization may face (Albrecht, Albrecht, and Albrecht, 2006)

ABSTRACT

Agency banking is a fairly new model in Kenya which has attracted attention from researchers because of its contribution towards financial inclusion. Fraud has been identified as one of the challenges in agency banking but it is not clear which fraud risk management practices are adopted in agency banking. This prompted the need to investigate these practices, their effect on level of activity by agent banks and to establish whether there is any association between fraud and agent banks characteristics. This was a descriptive and explanatory study targeting agent banks in Nairobi County. A random sampling method and a structured questionnaire were applied in sample selection and data collection respectively. Descriptive and inferential statistics were used for data analysis. With regard to the first objective, the study found that age of the business had a high positive significant relationship with split deposits and a negative one with identity theft. Proximity to bank branches had a positive correlation with unauthorised access of agent transactional data and fake ATMs but showed a negative relationship with unauthorized customer charges. Unauthorized PIN access showed a positive correlation with acting for multiple banks. Location had a correlation with registration of customers with fake details and extortion. In terms of the second objective, the findings revealed that the risk management practices which are effectively adopted in agent banks are Governance and leadership, preventive and detective. Monitoring and response practices scored poorly in terms of effectiveness. The third objective revealed that preventive, detective and monitoring practices have a statistically significant relationship with level of activity. These findings should be of interest to regulators, banks and bank agents in curbing fraud and improving performance by agent banks.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Risk management has been of importance to practitioners, academics as well as the business community mainly because it enhances organizational performance while creating value for the business (CGAP, 2015). Risk management is the process of understanding and managing risks that an organization may face. The one sector that really feels the need for risk management is financial services industry because such businesses take on other people's risks. In a report by Chironga, Cunha, Grandis, and Kuyoro (2018), cost of risk by African banks was second highest in the world. According to Bell and Jhang (2011), some of the key benefits of fraud risk assessment are reduction of fraud exposure, supplementing internal controls in fight against fraud and assisting towards meeting regulatory requirements.

Agency banking is a partnership with non-banks, which may range from kiosks, pharmacies, consumer goods distributors, and petrol station operators to provide distribution outlets for financial services (Kumar & ThorstenBeck, 2006). Agency banking adopts a small business structure, which helps to bank the poor and unbanked people, by taking services closer to them. According to CBK (2010), an agent is "an entity that has been contracted by an institution and approved by the Central Bank of Kenya to provide the services of the institution (a bank) on behalf of the institution." Agents are seen as the bricks and mortar of a DFS business. The institution (bank) chooses different ways for smooth management of agents. One arrangement is through Agent Network Managers (ANMs) who perform functions like selecting, contracting, training and monitoring, managing, and serving as liquidity managers. (CBK, 2016). Since their introduction, agent banks have suffered from fraud threat (Akelola, 2012; Agalla, 2014; FSD Kenya, 2010; Mundra, 2017). However, it is not clear which fraud risk management techniques are effective in curbing fraud in agent banks. Albrecht, Albrecht and Albrecht (2006), defines fraud as an act involving intentional deceit and attempted concealment to gain an advantage. Laws relating to fraud vary from one country to another but there are universal principles on effective fraud risk management. These principles are, prevention, governance, detection, response and monitoring (CGMA, 2012). According to ACFE (2016), organizations lose approximately 5% of their annual income to fraud but risk management professionals underestimate the role of fraud in their duties.

CGMA (2012) reported that although it is not possible to eliminate all fraud, indicators and alerts are best used as fraud occurrence warnings. According to (CGAP, 2015) although Kenyan banks are permitted to do inspection of agents, there has been no evidence of specific examination procedures.

CGMA (2012) argues that the two key components of fraud prevention are a sound ethical culture and sound internal control systems. Internal controls comprise of all the organizational policies and procedures which thrive on an ethical environment. If the environment is rotten then the procedures become irrelevant so the two components are interrelated. Fraud detection uncovers fraud while prevention stops fraud from happening. The major elements in fraud detection include data mining, trend analysis and ongoing risk assessment (Opiyo, 2015). Different researchers have different understanding of fraud risk management which have led to varied findings. While some (Kovacs & David, 2016; Waigumo,2003; Wanga, 2013) find preventive and detective to be most important others like (Action Fraud, 2017 & CGMA, 2012) argue that governance plays the most critical role in fraud management.

When banks adopt agency banking, they engage in policies and procedures for managing the related risks. According to CGAP (2015), banks engage in preventive techniques, training and monitoring in accordance with the regulatory requirements. The banks set the content and frequency of the training and monitoring. In Kenya, training should be in accordance with the bank's operational manual (CBK, 2016). Monitoring of agents is done onsite as well as by principal banks having a remote transaction monitoring system. This way, it is possible to catch fraudulent transactions. Periodic visits should also be done to the agent banks on a sampling basis. A branch manager should be in charge of the nearest agent bank and he becomes responsible for reporting to the bank (CGAP, 2015).

Agency banking has become a key factor in developing and emerging economies. According to CBK (2016), by the end of 2017, 18 commercial banks had contracted 53,833 agents in Kenya and this was an increase from 40,592 recorded in 2015.The number of transactions increased by 30.9% from 79,620,211 in 2015 to 104,193,459 by December 2016 as shown in table 1.1. According to Atandi (2013), the level of risk to which a bank is exposed to fraud as a result of agents' use depend on extent to which the institution engages them, activities by agents and how the bank manages the agent functions.

There is need for not only oversight and monitoring but also key considerations in the process of selecting and training the agents (CBK, 2009). As more banks transact via retail agents, there is concern about whether there is security relating to customer money (Deloitte, 2013). Dias and McKee (2010), proposed that the best measures for reduction of the incidences and consequences of fraud is for banks to screen, qualify, and monitor their agents. Another report by CGAP (2011), advises that in the absence of regulatory or supervisory requirements, a bank should put in place internal policies and procedures. ACFE (2017) posits that FRM requires a proactive approach based on the size, structure, nature of operations and the environment a business operates in.

According to CGAP (2015), risks associated with agents can be technological, credit, operational, legal and reputational as well as consumer related. Countries take different risk management approaches towards risks in agency banking. Oxford Policy Management (2011) report showed that whereas Brazil and Mexico have adopted rules to ensure price transparency by agents, in India and Peru such rules are set in general consumer protection regulations. Brazilian regulation requires banks to be fully liable for their agents' while Peru, the Philippines, Mexico, Colombia and India have extensive data privacy regulations and require agents be trained with respect to bank secrecy, anti-money laundering, and data privacy compliance. Brazil however has little data privacy regulations while Kenya has no rules for agents of mobile payments providers such as M-PESA (Dias & McKee, 2010).

While studies have been done on agency fraud, limited research has been undertaken about how agents identify, classify, and manage the risks resulting from customer relations. Supervisory resources are a major constraint in many developing countries where agents are being used in increasing scale resulting to customers taking advantage. This paper therefore sought to provide an early attempt to help agents/ supervisors/regulators implement an effective risk-based approach to prevent such fraud.

Agency banking started in Brazil in 1999 and has since been adopted in other developing countries. Bank agents provide a wide range of services like transmitting information, Cash handling, Processing information, and Electronic Funds Transfer (CGAP, 2011). Banks are now using agents to provide financial services. Countries where agency banking is currently flourishing include Brazil, Kenya, Colombia, India, Mexico, Pakistan and Peru (FSD Kenya, 2010). In the recent past, agents were used mostly by banks in Latin America and some Asian

countries, such as Bangladesh, India, and Pakistan, and by nonbanks in Africa. However, this is changing and nonbanks are now entering the Latin American and Asian markets and banks are building up on their agent businesses in Africa (CGAP, 2015).

CBK (2016), indicated there were a total of 42 commercial banks in Kenya under the regulation of the Central Bank of Kenya. For the country to achieve its vision 2030 goal of financial inclusion, the Banking Act was amended in November 2009, to include provisions on financial institutions' use of agents to provide banking services. Agents may provide cash in/ cash out services, engage in bill payments, withdrawals and transfers or provide a wider array of services including selling credit and it is upon the principal institution to assess suitability of an agent before they are registered as such (CBK, 2010). In the same report the total value of agent banking transactions increased from Sh65.0 billion to Sh176.7 billion in 2016. This was highly attributable to increased confidence and acceptability of the agency banking model by banks and the public as well. Agent transactions hit the 1Trillion shillings mark in 2015 (Irungu, 2015). According to African Independent (2017), the value increased from 4.3 billion dollars in 2015 to over 7 billion dollars in 2017. In 2015, data from Central Bank showed that agents handled Sh99 billion in the three months between September and December which translates to more than a billion shillings daily. This is further explained in the following table.

Table 1.1: Agent banks outreach indicator

	2014	**2015**	**2016**	**Cumulative (2010-2016)**
Number of banks contracting agents	16	17	18	
Total Agents appointed	35,847	40,592	53,833	
Number of agency transactions	60 Million	79.9 Million	102 Million	323 Million
Value of transactions(Kshs)	345.7 Million	442.9 Million	734.3Million	2.13 Trillion

Source CBK, 2016

Performance is a subjective measure of how an organization or a firm uses its assets to generate income, and also a measure of a firm's overall financial health over a given period of time. Performance measurement tools can help identify weaknesses, improve management processes and clarify objectives. These measures vary and include use of growth opportunities, indebtedness, product innovation, organizational changes, revenue and perceived growth. Researchers differ on performance indicators. Olaru, Pirnea, Hohan and Maftei (2013), have argued that SMEs with integrated management systems lean more

towards financial measures while Matsoso & Benedict (2014) are of the opinion that most small businesses use non-financial measures. The balance score card approach by Kaplan and Norton requires that management focus on factors which create long term economic value. According to a study by Ankrah and Mensah (2015), personal performance and customer satisfaction are used as performance measures by small enterprises. Other studies use owner expectations, ability to stay in the market and customer growth as measures of success. Such inconsistencies have led to difference in results.

A 2016 World Bank survey reported access to formal financial services had increased from 27% of Kenyan bankable population in 2006 to 70% in 2015. AB is regarded to be more convenient than visiting a bank branch (CGAP, 2006). This branchless model however suffered a major blow from mobile phone companies (Josiah Aduda, 2013). Fraud is seen to be one of the major challenges facing agency banking adoption (Helix Institute of Digital Finance, 2017).

According to Deloitte (2013), bank fraud has become sophisticated and is increasing at a rate of more than 15% yearly. This is due to lack of oversight, pressure to meet targets, collusion amongst employees and with outsiders as well as lack of tools to identify red flags. The report cited that most of the fraud is in retail banking. This study therefore sought to analyse whether agent banks characteristics are to blame for increased fraud in retail banking. This would be possible by establishing whether fraud types are the same across all agent banks.

1.2 Statement of the Problem

According to Action Fraud (2017) as many as two in four small businesses fall victim to fraud but agent banks like most SMEs have not been very open about fraud occurrences. This is because business owners wish to portray efficiency and effectiveness in running their businesses. Laufer (2011) argues that the most effective thing a business owner can do to prevent fraud is to lead by example.

Fraud risk is among the top three risks facing financial institutions in Kenya (Mwithi, 2015). When compared to other countries in East Africa, the Kenyan banking sector ranks highest in fraud (Kiragu, Wanjau, Gekara, & Kanali, 2013). Because of their responsibility in financial intermediation, banks play a major role and occupy a unique position within the Kenyan economy (CBK, 2010). Although most of the banks comply with risk management

guidelines, there are still concerns with fraud risk (CBK, 2015). Adoption of agency banking has played a major role towards financial inclusion albeit with challenges. According to Helix Institute of Digital Finance (2017), the challenges facing agency banking are fraud risk, client uptake, liquidity and lack of training.

Risk assessment studies have been inconsistent due to geographical location, timing and methodologies adopted. Studies in developed countries differ with those in developing because the countries are at different risk management stages. According to Ajibo (2015) in Nigeria for example, risk management is still in its very early stages. In a report by (Sayar & Wolfe, 2007) risk management approaches in Turkey are technological while those by British banks are more conventional. Such differences are attributed to contrasting banking cultures and technological appetite between countries. Timing bears different results in that recent studies adopt more comprehensive approaches when compared to earlier ones. This is because fraud has become complex overtime (KPMG Forensic, 2014). Supervision and regulation have not been sufficient in dealing with fraud related challenges in agent banks due to lack of participation by policymakers, financial institutions and consumer society groups (Dias & McKee, 2010). Because of such differences in findings, there has not been conclusive research on FRM practices in agency banking. According to Deloitte (2013) most fraud in banks is discovered through complaints by customers, internal whistleblowers and during reconcilliation of accounts. In agent banks where conventional book keeping rarely happens, fraud might be discovered by tracing it to certain organizational characteristics. With a clear understanding of the fraud types to look out for, effective techniques and their effect on activity level, providers would be able to deal with fraud and prevent huge losses which are accountable to fraud. Fraud losses are usually transferred as increased costs to the customers. If this happens, the model fails in the primary reason it was intended for of banking the poor. The losses could lead to closure of the facilities which play a huge role in financial inclusion. While previous studies focused on fraud risk practices and others on performance drivers, this research links FRM practices to activity levels in agent banks.

1.3 Research Objectives

1.3.1 General Objective

The main objective of this study was to investigate the effect of fraud risk management practices on activity levels by agent banks in Nairobi County.

1.3.2 Specific Objectives

The study sought to address the following objectives:

1. To establish whether there exists any association between fraud types and the characteristics of agent banks in Nairobi County.
2. To establish the fraud risk management practices adopted to address fraud related challenges in agent banks in Nairobi County.
3. To analyse the association between fraud risk management practices and activity levels by agent banks in Nairobi County.

1.4 Research Questions

The study sought to answer the following questions:

1. Is there an association between agency fraud types and the characteristics of agent banks in Nairobi County?
2. Which fraud risk management practices are adopted to address fraud related challenges in agent banks in Nairobi County?
3. What is the association between fraud risk management practices and activity levels by agent banks in Nairobi County?

1.5 Scope of the Study

The study was conducted in Nairobi County with the population focus being 150 agent banks acting on behalf of different commercial banks.

1.6 Significance of the Study

The findings of this study are significant to the following;-

1.6.1 Regulators and Bank managers

The main purpose for introducing the agency banking model was to have more people access banking services. Adoption of the model has however suffered setbacks like fraud among others. This study adds value to the policy makers/regulators in addressing issues related to fraud in agency banking with regards to financial institutions. Agent banks performance affect the overall success of the bank and data from this study is relevant to bank managers who are answerable to the regulator.

1.6.2 Agent banks and affiliate banks

Since fraud is a major factor that affects agency banking and the institutions which they act on behalf of, this study helps agent banks and principal commercial banks to formulate appropriate mechanisms to identify and overcome fraud related challenges; as well as inform them on the constraints they may face. The study helped identify which of the measures already in place are effective or not and to what extent.

1.6.3 Academic researchers

This study also contributes to the existing literature in the field of fraud awareness, prevention and response in the implementation of agency banking. It is hoped that this forms basis for further research on the subject.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of related works on fraud risk management and banking performance by other researchers, academicians, and authors. The review considers agency theory, fraud triangle/diamond theory and the fraud management life cycle theory. The chapter also includes a conceptual framework showing relationship between the variables under study.

Most fraud takes a median period of between 18 and 36 months before detection. Most organizations do not recover the losses amounting from fraud as only 12% recover fully (ACFE, 2016). Organizations and businesses which have anti-fraud controls in place report lower losses when compared to those that do not have such controls. FRM has been on the rise mainly because of increase in scrutiny by governments and regulators. Preventive and detective techniques play a huge role in fraud risk management. Fraud detection focuses on alerts while prevention stops the actual act from occurring. Fraud risk management is a continuous process as organizations are disposed to different risks every day. An organization should analyze its position and its goals with regards to preventing, detecting and response to fraud. For successful fight against fraud, financial institutions must understand where their vulnerabilities lie. With organizations losing five percent of their revenues to fraud, fraud risk management becomes of importance in enhancing performance. Periodic reviews of agent networks in all aspects including financial and operational help a lot to identify new and growing weaknesses.

2.2 Theories on Fraud Risk Management and agency banking.

Risk management in agency banking has been discussed by different researchers using theories like agency theory, fraud triangle and diamond theory, bank led theory, non-bank led theory, financial intermediation theory and fraud management lifecycle theory((Jensen & Meckling, 1976, Albrecht, Albrecht, & Albrecht, 2006; Greenbaum & Thakor, 2007; Wesley, 2004). The theories which this study adopted are agency, fraud triangle, diamond, pentagon and the fraud management life cycle theories. These theories are hereby discussed.

2.2.1 Agency theory

The agent/principal issue had been pondered from as early as the 18th century by Adam Smith, when he warned against managers handling money that is not theirs. The agency theory however emerged in the early 1970's. Agency relationship is when a person/entity is engaged by another/principal to perform services on their behalf (Jensen & Meckling, 1976). Agency theory studies the agency relationship and the issues arising there from. Agency problem mainly arises because the principal and agent may not always share the same interests. Agency problem can be principal problem, agent problem and policing mechanisms. The principal's problem is to ensure the agent is motivated enough in order for them to work towards their (principal's) goal. Agent problem on the other hand involves the agent having to balance between acting in the principal's or own interests. Policing mechanisms are intended to limit the agents' discretion. Agency problems bear agency costs (Mudiri, 2017). Agency costs arise when there is need to monitor the agent. Agency costs affect overall performance of the agent bank as well as the principal bank. This means the agency theory and more so the agency cost has a direct relationship with the firm's success.

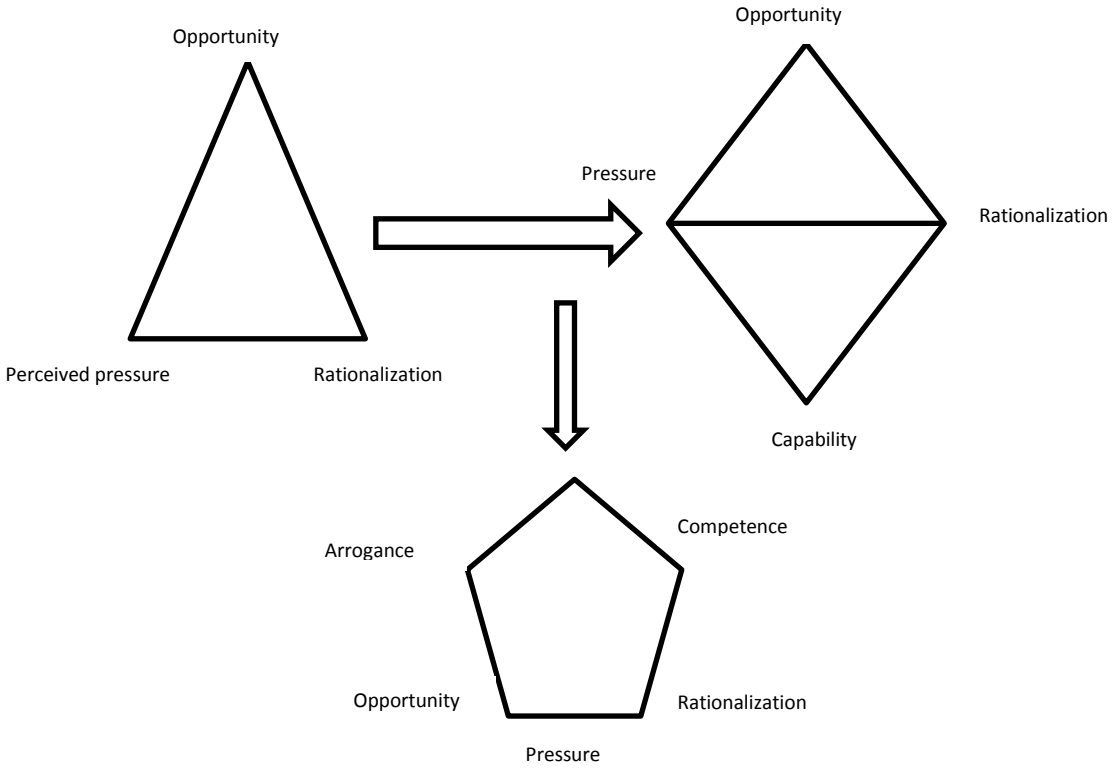
When commercial banks adopt the agency banking model, this becomes a principal agent relationship. This relationship has benefits and risks in equal measures Mungai (2016), and fraud is one such risk. The two parties in this agency relationship must work together to reduce fraud occurrences and losses. The financial and non-financial loss that a business suffers due to fraud is an agency cost which must be minimized by applying the most effective fraud risk management technique. Agency theory informs this study by explaining the agency relationship, the fraud challenges therein and how this impacts the activity levels in agent banks.

2.2.2 Fraud Triangle, Diamond and Pentagon theories.

In 1950, a criminologist, Donald Cressey started a study into why people commit fraud. After interviewing 250 criminals, he concluded that fraudsters exhibit three fraud triggers traits. These three are pressure/motive to violate trust, opportunity to commit the violation and rationalization. Cressey's hypothesis is known as the 'fraud triangle'. Albrecht et al (2006) mentioned that the motives for fraud can be financial or non-financial. Over time a fourth element was added to the fraud triangle making it the fraud diamond. This fourth element is capability to conceal fraud (Jonas & Lukas, 2013). It is argued that a person must have the ability to recognize an opportunity and take advantage of it, not once but many times over

(T.Wolfe & R.Hermanson, 2004). A recent theory that explores deeply on fraud triggers is the Fraud pentagon theory by Crowe Howarth in 2011. The additional element on FPT which was not in the FTT was competence. Competence has similar meaning with capability as described in the FDT. According to Sorunke (2016), arrogance as the fifth element is described as a feeling where one doesn't respect organization's internal controls due to superiority attitude. This is illustrated in figure 2.1

Figure 2.1 Fraud drivers: Fraud Triangle, Fraud Diamond and Fraud Pentagon



According to Abdullahi, Mansor and Nuhu (2015) fraud levels and costs that are concealed increase with time. It is upon the anti-graft bodies to understand what leads to fraud in order to seal the loopholes. However as much as a lot is expected to prevent and detect fraud, detection requires knowledge about fraud nature, mode of operation as well as how it is concealed (Kassem & Higson, 2012). Prevention is important since by the time fraud is detected, an entity have suffered financial loss and damage. To reduce fraud opportunities, the COSO internal control framework provides a foundation for prevention and detection. This framework consists of control environment, risk assessment, control activities,

information and communication and monitoring. Opportunity to commit fraud is blamed on poor organizational structures, and internal controls.

Agency banking fraud is due to opportunities in weak supervision, weak controls and poor segregation of duties (Akelola, 2012). These opportunities are in interaction with other fraud elements. If one element is removed from the equation, it is unlikely that fraud will happen. Based on this theory it is evident that fraud is not a random act but rather a well calculated move. In an agent and principal bank relationship, management should take steps to reduce pressure on the agents even though not all pressures can be eliminated. This makes opportunity which is a key element in the fraud triangle one where management has maximum control in (Auditor of Public Accounts, 2011). Kelly and A.Hartley (2010) are of the opinion that people are likely to take advantage of opportunities which are at their disposal. Opportunity is seen as the oxygen that keeps the fraud fire burning so it is upon the banks to control that and reduce fraud occurrence by adopting effective risk management practices. In the Kroll Advisory Solutions (2013) report, fraud in the financial sector industry is at a high prevalence rate while the degree of investing in fraud countermeasures is moderate. From understanding of these fraud theories, opportunities to commit fraud should be minimized if not eliminated. This requires application of risk management practices. The three theories were applied in analyzing characteristics that lead to fraud and looking at ways in which they can be eliminated.

2.2.3 Fraud management life cycle theory

Wesley's Fraud Management Life cycle has eight stages namely, deterrence, prevention, detection, mitigation, analysis, policy, investigation and prosecution. Wesley (2004) is of the opinion that these stages do not have to occur in any sequential or linear flow like in the fraud triangle theory. Deterrence stage is characterized by actions to inhibit fraud before further attempts are carried out. Prevention involves keeping the entity's processes and systems secure and safe from fraud. Detection is where methods are used to identify and locate fraud before, during and after completion of the fraud activity (KPMG Forensic, 2014). Detection aims to uncover presence of fraud. Mitigation focuses on stopping losses from occurring. During analysis stage, the losses which have occurred despite the previous stages are studied. Policy stage is characterized by creation, evaluation, communication and adoption of policies to reduce fraud. Investigation stage is where evidence is gathered to stop fraud from continuing to happen. The final stage is prosecution where failures and successes in fraud

management cycle come to be appreciated. Failures mean fraud has happened while successes mean that fraud is detected, the suspect(s) identified, apprehended, and necessary charges filed. The processes are as indicated in figure 2.2

Figure 2.2 Fraud management life cycle

Source: Adapted from Wesley, 2004

In the fight against agency banking fraud, all these stages need to be integrated and balanced. In a Deloitte (2013) report, bank fraud was the third highest, the first two being insurance and telecommunications sectors respectively. The processes under Fraud management life cycle theory are evaluated to establish their relationship with levels of activity in agent banks.

2.3 Empirical review of literature

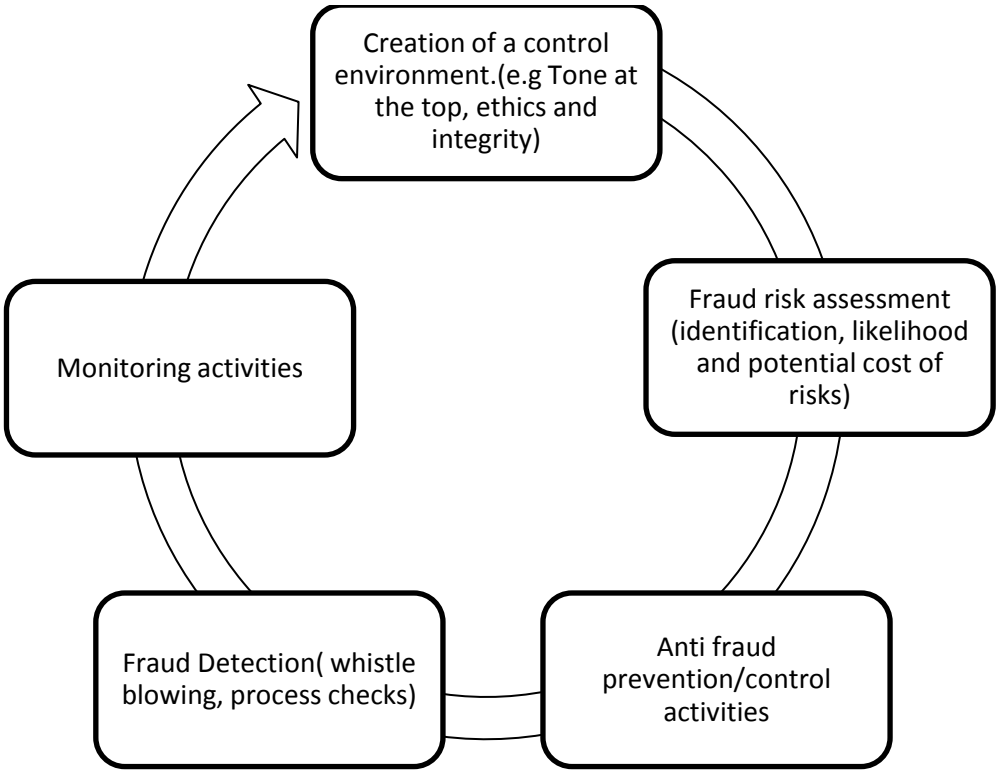
Following is a review of literature that has been done on fraud risk management, level of activity and characteristics of agent banks. The focus is on the banking sector and SMEs because agent banks adopt small and medium business structures.

2.3.1 Fraud risk management and activity levels by banks

Fraud risk management studies in banks have taken different approaches. Some researchers have looked at developing tools to manage risks (Bell & Jhang, 2011; Wright, 2007; Kovacs & David, 2016; Prabowo, 2012; J.F.Bishop, 2004) while others focused at how FRM impacts activity levels in commercial banks (O.L.Hoffmann & Birnbrich, 2012; Shen & Hartarska, 2013). Others evaluated the extent to which banks use risk management practices (Khalid & Amjad, 2012; Dedman & Robert-Tissot, 2008; Sharifi, Haldar, & Rao, 2016; Button et al 2015). Pearce (2011) held that governments, regulators and financial infrastructure should work towards achievement of financial inclusion by managing the risks which act as hindrances. According to ACFE (2017), a FRM program should include procedures for

receiving fraud allegations, investigative procedures, punishing and remediating procedures. Figure 2.3 is a representation of the main aspects of a FRM framework.

Figure 2.3 Fraud risk management framework



Source: COSO, 2013

There is a positive relationship between FRM and activity levels (Ohando, 2014; Mutuku, 2016; Agalla, 2014; Waigumo, 2003). Preventive and detective FRM have strong positive impact on level of activities of commercial banks. Preventive measures adopted by banks include and not limited to strong controls, management oversight, antifraud policies, and surprise audits. The detective practices are internal audits and bank reconciliations while response mechanisms are recovery of stolen assets and strengthening of internal controls. This means that for banks to control fraud, they should adopt preventive and detective mechanisms. Mutuku (2016) found that budgets should be put in place to cater for the ever changing risk environment. In a similar study by Mutua (2014) on the effect of credit risk management by commercial banks in Kenya, the importance of having mechanisms against risk is reiterated. The study however concluded that credit risk identification had less impact on activity levels while non-performing loans were found to have a very huge negative

impact. Commercial banks are advised to adopt different financing methods to help cut costs, improve business processes and customer relations.

Previous studies show that there exist a relationship between fraud risk management and activity levels (Muteti, 2014; Waigumo,2003; Wanga, 2013; Kiragu et al, 2013). Muteti (2014) found there was a negative relationship between; interest risk, foreign exchange risk, liquidity risk, credit risk and activity levels of banks while Waigumo (2003) found a positive relationship. According to Muteti (2014) banks should control their credit risk through non-performing loans, and hedge against foreign exchange and interest risks. His study also showed a positive relationship between capital management, bank size and deposits. This variance in results was attributed to methodologies adopted. Waigumo (2003) coded data into SPSS software, where descriptive and statistical frequencies were used and she concluded that unapproved loans increased fraud levels while credit cards, computer fraud and account opening manifested high to very high fraud levels. On the other hand counterfeit money, account opening and money transfers led to little occurrence of fraud. (Wanga, 2013), found that the highest fraud risk facing banks was identity theft. These studies agreed there is need for information sharing on fraud issues and that banks should approach fraud issues as a sector as opposed to individual banks. This is because there are times when banks suffer fraud from same fraudsters due to lack of information sharing.

Studies show that banks adopt different practices in the fight against fraud. According to Wanga (2013) banks largely use preventive strategies and whistle blowing from within and without the business. The study recommended reforms in the police and judiciary so as to deal with fraud issues in the banking sector. Waigumo (2003) and Muteti (2014) agreed that as much as Kenyan banks adopt preventive and detective mechanisms to curb fraud, there is still very high occurrences of real time gross settlement fraud. Mungai (2016), enhanced the importance of training and monitoring and recommended the need for agent banks supervisors to be specifically trained in managerial and financial competencies which they in turn would transfer to agents. Ogola, K'Aol and Linge (2016) were of the opinion that tone at the top was negatively correlated with amount and frequency of fraud. Control systems set by the CBK lowers fraud levels to significant levels and strategies to fight fraud risk yielded higher fraud loss rates (Abolo, 2017). Ogola et al (2016) and Muteti (2014) recommended frequent tests for all banks' employees as well as creation of fraud specific reports. This is in agreement with other studies on high need for adoption of anti-fraud measures.

In Nigeria where fraud risk management is in its early stages, banks are encouraged to develop effective risk management structures. The Nigerian Banking regulation future lies in a risk based framework (Ajibo, 2015). Thus, the Nigerian Credit rating should not be a substitute for oversight functions and due diligence exercises. The central Bank of Nigeria should also provide a credit risk management bureau to serve as a medium for mitigation. It is recommended by Achugamonu (2017) that licensing more agents and having user friendly products would go a long way in ensuring that the government agenda of banking the poor in Nigeria is achieved. Levels of illiteracy among the unbanked, poor geographical spread of AB and lack of awareness are the major setbacks towards financial inclusion.

2.3.2 Fraud and activity levels in agent banks

Alexandra (2011) argued that as much as agency banking is important for the developing countries towards financial inclusion, a lot of awareness need to be done about the model and governments in collaboration with regulators should give maximum support for the model to succeed. Similarly, Agalla (2014) recommended that regulator monitoring of agent banks and agent documents is critical. Updated technology is seen as the link between banks and their agents so there is need to invest in updated and efficient technology. These two studies focused on challenges facing implementation of agency banking and it was established the major factors are poor training, poor resource allocation and outdated technological instruments. The study design was both descriptive and explanatory using questionnaires and the Microsoft Excel tools to analyze.

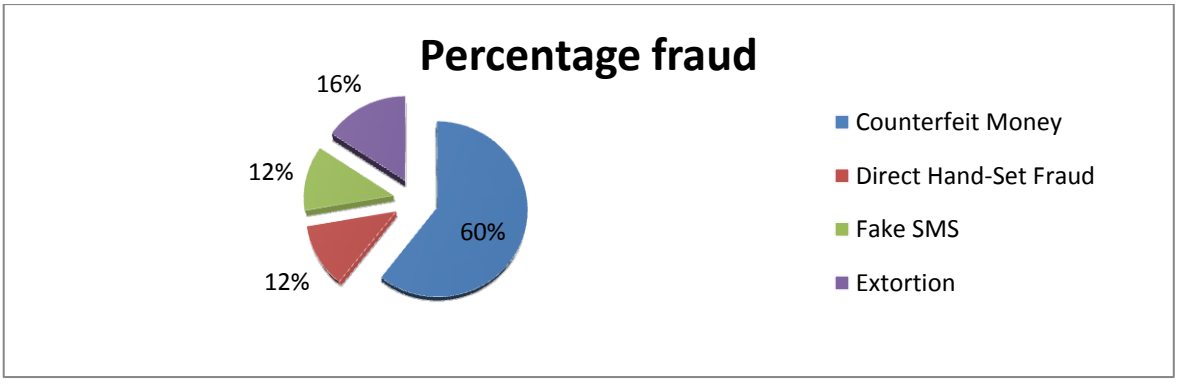
Kiragu et al (2013) studied 10 commercial banks in Kenya that had adopted agency banking, to evaluate the relationship that AB had with activity levels of commercial banks in Kenya. Like the previous studies, he concluded that agent training and improved technology makes a huge difference towards success of the model. Financial reports by mainstream banks and the CBKs annual reports were analyzed and it was found that there is a positive correlation between activity levels by agents with volume of money by affiliate banks. This agreed with CBK (2016), that AB is a huge contributing factor towards the overall performance of mainstream banks because it reduces costs of setting up and hiring personnel. It should however be noted that for the agent banks to be successful, the principal banks should cushion them against some costs like set up, transit related and insurance costs.

Akelola (2012) used the fraud triangle in her research to predict fraud patterns but it was not found to be effective given the nature of the Kenyan fraudsters. Weak industry cooperation, poor policing infrastructure, ineffective justice system, weak regulatory framework and lack of fraud budgets were identified. The research agreed with other studies that fraud is a major issue in the Kenyan banking industry, but disagreed that the size of fraud was huge and sophisticated. This contradicted other similar studies, and therefore there is need for different approaches like theoretical and conceptual as opposed to just environmental factors for more conclusiveness.

Mungai (2016) did an assessment of factors that determine performance of agent banks in Kenya. Stratified sampling and questionnaires were used, and data was analyzed using descriptive and inferential statistics. Among all the respondents, the only reason and threat that would make them leave the lucrative venture was robbery and theft. The major expenses were costs of acquiring transaction devices, rent and electricity. The study also found that agent banking helped increase the number of customers frequenting stores which transacted other businesses together with the agency banking transactions. Agents' performance was highly dependent on ability of the owner to borrow funds, their ability to manage business finance as well as their ability to manage the core business. Since the model is highly dependent on network coverage and security of the environment there is need to ensure these two factors are enhanced.

A survey by CBK in 2015 indicated that agent banks reported 1,297 fraud cases of which most involved counterfeit notes and robbery. According to a study by FSD Kenya, the fraud types among agent banks were as illustrated in figure 2.4.

Chart 2.4 Percentages of fraud by Agent Banks.



Source: (FSD Kenya, 2010)

2.3.3 Activity levels and business characteristics

Performance is an area that has been understood differently by researchers. While they agree that activity levels quantify the efficiency and effectiveness of an organization, they differ on the control factors that determine the optimal performance. Performance measurement is diverse as authors suggest different guidelines, frameworks, models, processes, principles and techniques (Sergio, Elaine, Paulo, & Guimareraes, 2007).

Agent banks operate as small businesses and in Xiang and Worthington (2007) an SME is affected by the business size, level of innovation, the industry it is operating in and the business objectives. Agent banks operate in an industry where fraud is prevalent and therefore fraud risk management is important (African Independent, 2017). Karadag (2017) found that owner/ manager level of education as well as the age of the business have a positive relationship with activity levels but shows there is no significance when it came to the difference of industries. Hema, Gunapala and Anula (2008) concluded that there is a strong relationship between manager/ owner mentality and activity levels in small businesses. This relationship however becomes less significant as the business matures. In other similar studies Jaana and Mervi (2012) found that ownership structure has an impact on activity levels of small businesses while board structure has little impact. This could be interpreted to mean that the owners are risk averse. Most SMEs revolve around owner-managers so their individual characteristics may affect activity levels. Desiree (2016) found that businesses which are owned/ managed by both genders tend to perform better when compared to those by men only. According to Bahri, St-Pierre and Sakka (2017) relying on particular measures may result to contradictory information. This is because some practices are significant in some specific areas of a business but in terms of overall performance they may not be.

Agent banks operate as small enterprises which are mostly owner managed while being supervised by the principal banks. Activity levels in agent banks like in other similar businesses would be measured in terms of perceived growth (customer flow and deposits), indebtedness and revenue growth. Managing risks results to stakeholder confidence and employee morale which positively impact the overall success (Bell & Jhang, 2011). If fraud is not controlled, the costs are transferred to the customers and this affects the business which may lead to closure.

2.4 Research Gaps

From the reviewed literature the key fraud enablers in agency banking include and not limited to weak regulation, age of the agent banks, processes, compliance monitoring, cultural issues and seasons. Fraud in the banking sector is a very sensitive matter because banks need to protect their reputation as well as maintain customer confidence (ACFE, 2006). Atandi (2013) feels that agent banks operators/owners are also very protective in matters fraud because they want to be perceived as being effective and efficient. Most of the study done on agency banking is on adoption of the model and the challenges there in as well as their contribution towards the principal institutions profitability. Agent banks play a major role towards financial inclusion but fraud threat is a huge hindrance (Akelola, 2012 ;Alexandra, 2011). Little research has been done on fraud and risk management in agent banks, and their impact. This study linked FRM to activity levels. The study sought to fill this social and research gap by adding to existing literature, and establishing whether the prescribed FRM framework is effective in agent banks and if there is need for improvement.

2.5 Summary of the Literature

This chapter presented three theories underpinning the study as well as the empirical literature in fraud risk management and performance measures. Agency theory, fraud triangle/diamond and fraud risk management lifecycle was used to show the relationship between the variables. The fraud and agency theories helped inform on the specific characteristics which motivate /lead to fraud. The fraud management lifecycle theory gives a sequence of measures that should be applied in fighting fraud. The interaction of the three theories gave a more comprehensive insight in this research.

The literature review revealed that AB is important towards financial inclusion (African Independent, 2017). Agent banks reduce costs on banks as they do not need to inject capital into setting up branches and hiring workforce. Fraud has been cited as one of the major hindrances towards agency banking success. Performance measures vary across businesses and industries and so there is no one suit for all. Little has been done on fraud types and management practices being by banks to solve fraud menace as well as how they are linked to activity levels. It is for this purpose that this study investigated the effect of fraud risk management on level of activity by agent banks.

2.6 Conceptual Framework

A conceptual framework identifies the variables that a researcher requires in their study (Kothari, 2004). It categorizes and describes concepts that are necessary to a study and map the relationships among those concepts. For this study three types of variables have been used. The dependent variable is agent banks activity levels while independent variable is FRM practices. There are also two intervening variables which are agent bank characteristics and fraud types. The conceptual framework herein links FRM to activity levels by looking at the fraud types and fraud risk practices that would influence the level of activity in agent banks. These factors have been summarized in figure 2.5

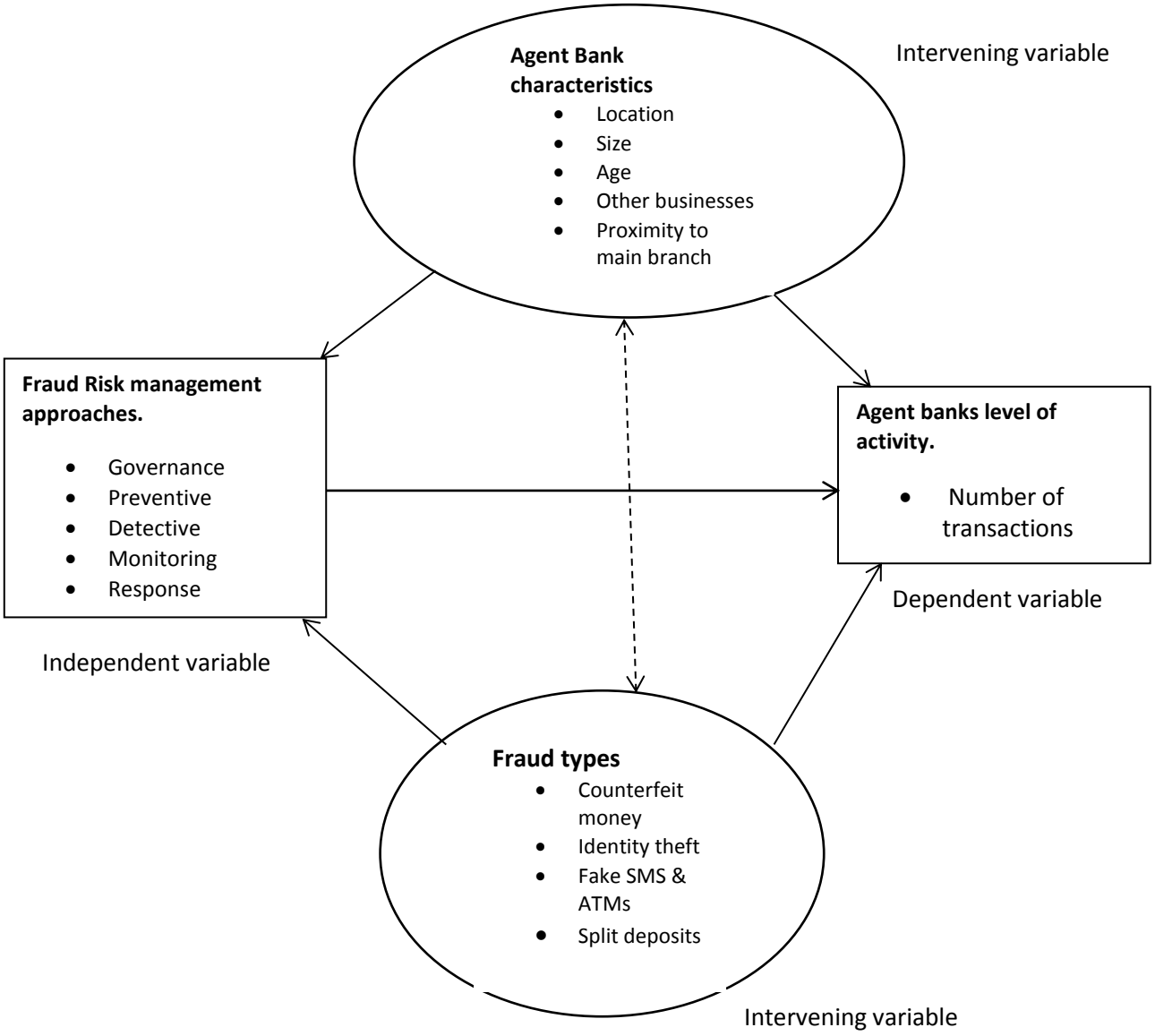


Figure 2.5 Conceptual framework

2.6.1 Operationalization of the variables

2.6.1.1 Agent banks characteristics

Existing data indicate that there could be some relationship between agent bank characteristics and types of fraud (Mungai, 2016). For example the physical location of an agent bank could predispose it to certain type of fraud risk. An agent bank that opens very early and closes late, faces more risk compared to the one that opens when the surrounding businesses have opened. Most agent banks engage in other businesses other than the AB transactions attracting many walk- ins and hence increase the risk of fraud occurrences. Agent bank characteristics is a control variable because it has an effect on the dependent variable and by extension on the independent variable.

2.6.1.2 Agency fraud types

The types of fraud may differ among agent banks and this study sought to establish whether and how the bank characteristics are associated with certain fraud types. In previous studies on challenges facing agent banks the prevalent types of fraud are measured in frequency levels (Alexandra, 2011; FSD Kenya, 2010;Helix Institute of Digital Finance, 2017). This similar approach was adopted in this research. Fraud types have an effect on groth and success of agent banks and also on the fraud risk techniques that are adopted, thus this becomes a control variable.

2.6.1.3 Fraud risk management techniques

No previous study has focused on association between fraud risk management and activity levels in agent banks. In this study the FRM techniques was measured by looking at how strong or weak they are. For instance if governance is not working then probably the overall fraud risk management framework doesn't either. Preventive practices were measured in terms of training and how businesses follow the code of conduct, communication and due diligence (CGMA, 2012). Detective measures looked at whistleblowing, monitoring and frequency of surprise audits by ANMs. Response was evaluated by whether the agent banks take remedial actions after fraud is detected as prescribed in (J.F.Bishop, 2004).

2.6.1.4 Activity levels of agent banks

Activity level was measured by the number of transactions which in turn impacts revenue. There are three scenarios that can describe success in a business. A firm can be profitable; it can break even or make a loss (Kiragu, Wanjau, Gekara, & Kanali, 2013). The aim of most businesses is to make a profit thus creating value for the owner. In Kenya no previous study has been done on fraud risk management and activity levels in agent banks as most have focused on commercial banks. In those studies, activity levels were measured by transactions and growth in customers (Ankrah & Mensah, 2015; Akelola, 2012). In agent banks which adopt a small business model, common performance measures are perceived growth, revenue and customer growth. As an agent serves more transactions, there is revenue increase in terms of commissions and thus improvement in the overall performance of the business.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology for collecting and analyzing data to be able to test the objectives of the study. The chapter also gives the scope of research design and procedure, the target population, sampling techniques and overall frame work of the study. The relationship between the variables was explored using correlation, frequency measures and regression methods.

3.2 Research Philosophy

Saunders et al (2009) defines a research philosophy as a term relating to the development and nature of knowledge. In research one makes assumptions about human knowledge, reality and based on values and ethics (Kothari, 2004). A well thought out philosophy underpins the methodology, research strategy as well as data collection techniques and analysis procedures. A positivistic philosophy deals with units that can be observed and tested. This study was based on the positivist approach which implies that the researcher is working with an observable social reality (Saunders et al, 2009). This philosophy assumes the researcher is looking for relationships or correlations between variables using structured questionnaires and official statistics for reliability and representativeness (S.Kuhn, 2004).

3.2 Research Design

According to Kothari (2004), a research design is the plan and a road map towards answering questions in the study. Research can be quantitative, qualitative or a mixture of the two methods (Creswell, 2008; Cohen et al., 2007; Gliner et al., 2009; Kothari, 2004). This study adopted both descriptive and explanatory designs that investigated the effect of fraud risk management practices on AB activity levels. This design was preferred as it objectively describes characteristics and functions as opposed to thoughts and ideas. A descriptive design suited this study as it follows a structured research process and a preplanned statistical design. The motive of the study was to analyze and describe fraud aspects in agency banking and being a qualitative study, it was best to rely on descriptive narrative for data analysis as indicated in (Gunnell, 2016). A descriptive research design describes aspects of a phenomenon or a sample population (Alexandra, 2011;Atandi, 2013). Explanatory design was adopted because the conceptual framework is highly causal. The data then produced

conclusions which form basis of another research. Fraud has been identified as one of the major challenges inhibiting success of agency banking, but not much has been done on fraud risk management and activity levels in agent banks. This study therefore sought to investigate and describe the association between the variables.

3.3 Population

According to Kothari (2004), a population means all items in a field under inquiry. The target population in this study was the approved agent banks within Nairobi County. Nairobi records the highest number of agent banks in Kenya. According to CBK, 2017 there were a total of 2,256 agent banks in Nairobi. The population included agent bank owners and employees where the owners are not engaged in day to day running of the business.

3.4 Sampling Frame

Cooper et al, (2003) as cited in Wanga (2013) states that the basic idea about sampling is to select some elements in a population, from which a conclusion is drawn. A sampling frame is a source list from which a sample is drawn. Kothari (2004) argues that a sampling frame should be appropriate, correct and comprehensive. The sampling unit in this study was Nairobi County, and the sampling frame was agent banks in Nairobi County. The agent banks were selected randomly thus provided a mix in terms of culture, location as well as educational levels and therefore varied views and responses.

3.5 Sample and Sampling Technique

Different guidelines are proposed on selecting the right sample sizes. Creswell (2008) and Goes (2012) advocate for sample sizes of 20- 30 participants. Kothari (2004) argues that data saturation may happen when the researcher feels additional participants are represented in the existing categories and themes. The sample size in this study was 150 respondents since higher number of answers would be a true reflection of the population but avoiding saturation. A sample design is the technique or plan that a researcher uses to obtain a sample, given a population. This involves selection of items from a population. The sample design should be appropriate and reliable (Kothari, 2004). For this study, simple random sampling was used.

3.6 Data Collection Instrument and procedures

According to Walliman (2011) primary data is distinguished based on measurement, observation, interrogation and participation. For this study, questionnaires were used for primary data collection. Questionnaires provide advantages in time, cost, standardization and ease of use by respondents. The questionnaires contained both open and close ended questions. Close ended questions reduces bias of respondent disregarding some questions and limiting number of answers to exactly what is relevant for the study. Open ended questions aided in getting in depth understanding and explanation. Secondary data was used to make assessment by reviewing the previously presented evidence. The use of data from different sources helped identify biases and inaccuracies as well as different interpretations that have been previously made. This research mainly relied on primary data which is an immediate recording of the situation and that which has been observed close to the event (Walliman, 2011).

3.7 Data Processing and Analysis

Data analysis is an ongoing process starting with the first piece of data collected to data management, deduction and coding (Creswell, 2008). The aim is to identify patterns and links in and between the variables. Data was checked for accuracy and completeness, edited, compiled and then analyzed using SPSS and Excel software.

Inferential statistics were used; Spearman's Correlation analysis was used to establish relationship between the intervening and independent variables. Ordinal logistic regression was used after the assumptions of the model were passed. The assumptions of ordinal logistic model are dependent variable should be measured in ordinal scale and one or more of the independent variables should be categorical (Hilbe, 2009; Long, 2012). Kruskal-Wallis test and Pairwise comparison tests were done to analyze the fraud risk management practices, thus picking the most effective. Descriptive statistics was used to describe the sample. Mean, mode, frequencies and standard deviation were applied. Tables and graphs were used to present the data as they are easier to interpret.

Since the data was categorical, ordinal logistic regression was used to assess the relationship between variables. The independent variable was the fraud risk management practices (X), while the dependent variable(Y) was the activity levels by agent banks. The intervening variables were the fraud types and agent banks characteristics.

$$AB\_PERF_i = \alpha_0 + \beta_1 AB\_FRM_i + \beta_2 AB\_FRAUDTYPE_i + \beta_3 AB\_CHARACT_i + \varepsilon_i$$

Where; *AB_PEFR* = Agent banks activity levels.

ε = Error term

$\boldsymbol{\alpha}$ = Intercept

$\boldsymbol{\beta}_1$, $\boldsymbol{\beta}_2$, $\boldsymbol{\beta}_3$ = Regression coefficients

AB_FRM = Agent banks fraud risk management practices,

AB_FRAUDTYPE = Agent banks fraud types,

AB_CHARACT = Agent banks characteristics.

The model was used to demonstrate if there is relationship between independent and dependent variable, if the independent variables are correlated to each other, correlation between the intervening variables and lastly, the direct effect of the independent variable on the dependent variable.

Model Fitting Information and Goodness of fit were done to test the model. Pseudo *R*-square (multiple correlation coefficient of determination) was used to determine how much variance in the dependent variable could be accounted for by the independent variable and intervening variables. The *t* test was used to determine the significance of each predictor and beta coefficients was used to determine the magnitude of prediction for independent and intervening variable.

3.8 Research Quality

To ensure internal validity, pilot data collection was done before issuing the questionnaire to respondents. This resulted to editing the questionnaire to suit the research objectives. Objectivity was enhanced by ensuring there is no bias in data analysis, interpretation or in any other aspect of the research.

3.9 Ethical considerations

Kothari (2004) argues that ethical considerations are of utmost importance, particularly when research involves people. According to Saunders (2009), research ethics is the appropriate behaviour of research relative to societal norms. In this study, participation of respondents was voluntary and information was not shared or used for any other purposes but the intended one. Identity of the respondents is also kept confidential.

CHAPTER FOUR: PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents the research findings. Data from questionnaires was collected from agent banks' owners and employees. Presentation of data is organized in order of the specific objectives. Results on other necessary information are also presented.

4.2. Sample representation

A representative sample should reflect the population from which it is drawn (Cherry, 2017). The population in this study was quite big and given the time frame and resources, it was not possible to study every member. Random sampling was therefore used which gave every member of the population a chance of being selected. Different guidelines provide sufficient sample sizes for qualitative studies and authors have varied suggestions on sample sizes. While Morse (1994) suggests 30–50, Creswell (1998) argues that 20–30 is a valid sample size. Qualitative sample size is best determined by the time allotted, resources available, and study objectives (Kothari, 2004). This justifies the sample size of 150 based on the population in this study.

4.3. Descriptive statistics

Results from the questionnaires recorded females at 50.4% N=60 while 49.6 % N=59 were male. This means that there is equal gender distribution in the sector. The agent banks which were studied recorded varied results in terms of years of operation with 17.6% N=21 (over 7 years), 31.1%N=37(5 to 7 years), 33.6% N (3 to5years) and the rest 17.7% N=21(<3 years). 48%N=58 were stand -alone businesses while 51.3%N=61 were operating other businesses alongside the agent banks. The respondents who had other businesses meant to use that as a means to increase the flow of customers into their premises. Almost all the agent banks were sole proprietors at 91.6%N=109, compared to only 8.4%N=10 which were partnerships. In terms of level of education, the results showed that 95.8% N=114 were O-Level graduates and only 4.2% N=5 were undergraduates. This means that the employees and agent banks' owners had basic knowledge which is important in running the business. These findings show the respondents possessed knowledge to easily understand and fill in the questionnaire. In table 4.3 the summary statistics on data variables analysed are presented. The median ranges of 2-5 are measures effectiveness where 1 was most effective and 5 least effective. Skewness

shows that the data is not normally distributed as it is not zero or unimodal. This is further confirmed by kurtosis which is not zero as would be in a normally distributed data. The data was platykurtic distributions since the kurtosis are mostly negatives.

Table 4.3: Descriptive statistics

MEDIAN	Governance	Preventive	Response	Detective	Monitoring
Mean	2.35	3.20	3.86	4.11	3.00
Median	2.00	3.00	4.00	5.00	3.00
Variance	1.630	1.799	1.429	1.433	2.000
Std. Deviation	1.277	1.341	1.195	1.197	1.414
Minimum	1	1	1	1	2
Maximum	5	5	5	5	4
Range	4	4	4	4	2
Interquartile Range	2	2	2	2	
Skewness	.569	-.229	-.630	-1.092	
Kurtosis	-.907	-1.090	-.693	.547	
Count	119	119	119	119	

4.3.1 Level of activity in agent banks

Summary on questionnaire recorded the highest number of weekly transactions by agents was in the range of 51 to 100 at 40.3% N=48. This was followed by between 100 and 500 transactions at 31.9 % N=38 and over 500 at 15.1% N=18. Only 15 of the respondents served less than 50 transactions in a week. 86.5% N=103 and 89.1% N=106 of the respondents felt that fraud risk identification and investigative procedures respectively affected the number transactions they served. 84% N=100 and 74.8% N=89 people felt that agent bank location and inspection by principal banks respectively influenced the number of transactions they served.

4.4. Diagnostic tests

This section entails the diagnostic tests that were carried out before regression analysis. This was done to test the appropriateness of the model.

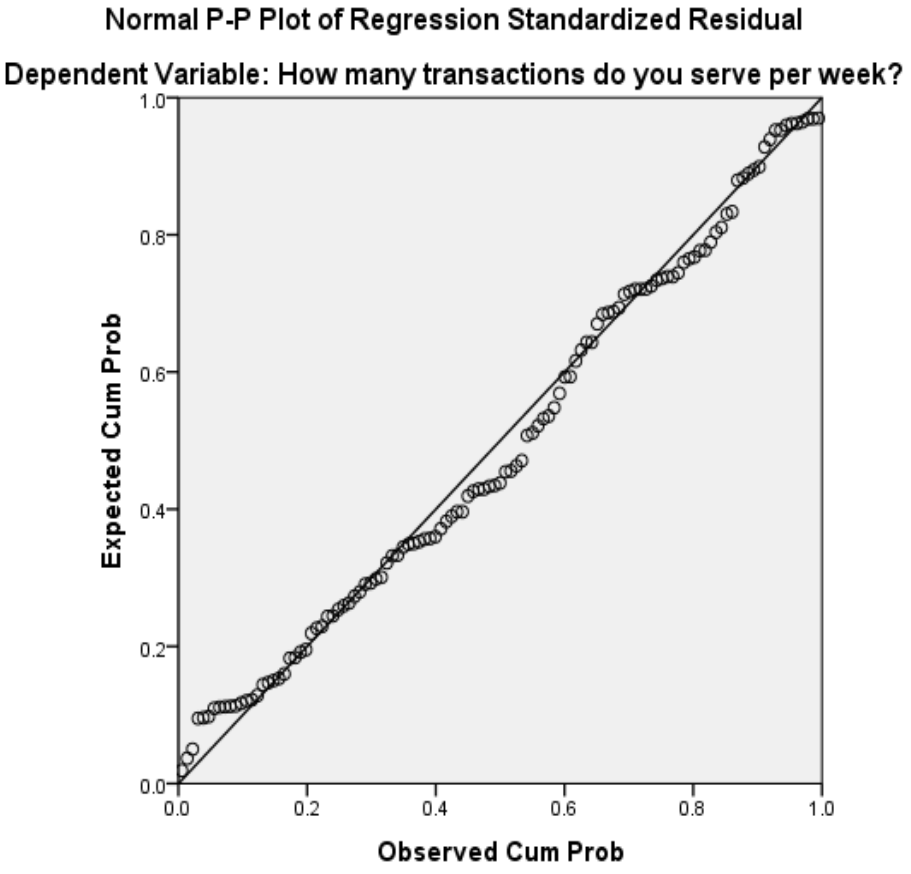
Table 4.4: Model Summary

Model				Durbin-Watson
				1.854
	Regressors		Tolerance	VIF
	(Constant)			
	Counterfeit money		.818	1.223
	Fake SMS		.825	1.213
	Debit card skimming		.840	1.190
	Identity theft		.823	1.215
	Fake ATMs		.890	1.124
	Split deposits/withdrawals		.856	1.169
	Unauthorized PIN access		.884	1.131
	Extortion		.815	1.226
	Imposing unauthorized customer charges.		.798	1.252
	Registration of customers with fake details.		.908	1.102
	Unauthorized access of agent transactional data		.827	1.210
	Customer collude with employee to defraud agent		.915	1.093
	Number of years in operation		.817	1.224
	Is it a stand-alone agent or it engages in other businesses?		.832	1.203
	Ownership of the business.		.853	1.172
	Governance		.715	1.399
	Preventive		.821	1.217
	Response		.838	1.193
	Detective		.782	1.279
	Monitoring		.752	1.330
	R^2	No. of observations	LM	Tabulated value (X^2) at 5%
Overall model	0.163	119	19.397	(21, 0.05) = 33.92
Total N				595
Median				2.000
Test statistic				87.141
Degree of freedom				4
Asymptotic Sig.(2-sided test)				.000

4.4.1 Test for normality

Normality tests are usually assumed in statistical research resulting to misleading misinterpretations and unreliable inferences (Park, 2006). According to Ghesani & Zahediatsl (2012) violation of normality should not be problematic if data is large (n>30 or 40) but never the less this study considered the normality test. Normality tests were done using P-P plot and histogram which are descriptive statistics (Zhang, 2008). The histogram was well curved but with spikes. The P-P plot (Figure 4.4) showed some points lay outside the straight line. Skewness and kurtosis were also used to check for normality. According to table 4.3, skewness is not zero and kurtosis is not 3 or -3 which led to the conclusion that the data is non parametric.

Figure 4.4: P-P Plot



4.4.2 Test for auto correlation

Autocorrelation refers to a situation where residuals in a model are correlated (Wooldridge, 2016). The null hypothesis was H0: no autocorrelation and H1: there was autocorrelation. Durbin Watson statistic was used to test for autocorrelation. From table 4.4, the calculated Durbin Watson statistics results (1.854), was closer to 2 and so the null hypothesis was rejected, meaning there is autocorrelation.

4.4.3 Test for multi-collinearity

According to Wooldridge (2016), multi-collinearity is a problem which arises when two or more independent variables are highly correlated. Tolerance values in table 4.4 are less than 1 which means there is multi-collinearity. Variance inflation factor (VIF) was also used to test whether the presence of multi-collinearity was statistically significant. VIF values which are between 1and 10 indicate multi-collinearity. Thus diagnostic tests results (tolerance and VIF) in table 4.4 show there is multi-collinearity.

4.4.4 Test for heteroscedasticity

The common assumption in regression is that the error term has equal variance. However in real life this assumption is not guaranteed and it is therefore important to detect heteroscedasticity in the error term before making inferences. Heteroscedasticity refers to situations where the variance is not constant which violates the assumptions of the error term. For non-parametric data this test is proposed based on squared residuals (Zhang, 2008). In this study Lagrange Multiplier (LM) was used to test for heteroscedasticity. This was calculated using R2 from the auxiliary regression and multiplying it by the number of observations, that is, $TR2 \sim \chi 2\ (n)$ where n is the number of regressors in the auxiliary regression. The null hypothesis being tested was H0; homoscedasticity while the alternative was H1; heteroscedasticity. As illustrated by the overall model in table 4.4, the LM value was lower than the chi square tabulated at 95% confidence level, thus we fail to reject the null hypothesis.

4.5 Bivariate analysis

A bivariate analysis is a statistical method for analyzing relationship between two variables (Cui & Graetorex, 2015). Under this section, the study focused on analysis where exactly two measurements are made on an observation. In this study a correlation test was done on the relationship between fraud types and agent banks characteristics.

4.5.1 Association between Fraud types and agent banks characteristics

A spearman rank order correlation was done. This type of a non-parametric test is used to evaluate degree of association between two variables (Hilbe, 2009). Calculation of spearman's correlation coefficient and significance testing requires that one variable is monotonically related to the other and that the scores are ordinal (Coffman, Maydeu, & Arnau, 2010). The analysis was done to establish whether there was a correlation between the agent banks characteristics and fraud types. A summary of the correlation results are presented in table 4.5. Significant probabilities are indicated in brackets in the correlation matrix table. The results showed that age of the business has a high positive significant relationship with split deposits (0.015, $p<0.05$). This could be attributed to the fact that as agent banks mature, the employees or owners understand the business better and able to manipulate it to reward themselves higher commissions. This is in agreement with (Albrecht et al, 2006) who found that as businesses age, fraud becomes more sophisticated but similarly the business owners understand the tricks used by fraudsters. The study established that unauthorised access of agent transactional data has a significant positive relationship with proximity to bank branches (0.027, $p<0.05$). This means that the further a bank branch is, the higher the likelihood of customer exploitation by the agents. The reasoning behind this could be the agents feel the customers have no other alternative to bank services. The fake ATMs showed a significant positive relationship with proximity to bank branches (0.059, $p<0.1$).This could be attributed to the fact that agents who are further away from main banks are more prone to fake ATMs exploitation. Unauthorized PIN access showed a positively significant relationship with acting for many banks (0.07, $p<0.1$). The more the number of banks the agent acted for, the higher the likelihood of risk of unauthorized PINs. There was a significant negative relation in proximity to bank branch with unauthorized customer charges (0.019, $p<0.05$). As proximity to bank branch decrease unauthorized charges increase. This could be because the agents feel that the customer has a reason to not visit the bank branch maybe to avoid the long queues, so the agents make them pay for such luxuries. The agents

could justify this by arguing that the opportunity costs that the customers incur to visit a bank branch will be higher than the charges at the agent banks. This finding agrees with the argument that agent banks bring services closer to the customers but comes with costs like possible exploitation (CGAP, 2015; Atandi, 2013).

Identity theft had a significant negative relationship with age of the business (0.055, $p<0.1$). As a business matures, fraudsters learn new loopholes they can manipulate. Agents may over time get used to certain customers, leading to laxity on checking their specific details but the customers will in turn come up with other fraud types while appearing clean on identity issues. This agrees with previous findings that fraud risk awareness should be a continuous process as any opportunity will be taken advantage of (Bell & Jhang, 2011). Registration of customers with fake details was negatively related with the location of the agent banks at significance levels of (0.08, $p<0.1$). Location and extortion similarly showed a positive significant relation (0.05, $p<0.1$).

Table 4.5: Correlation Matrix

			Counterfeit money	Fake SMS	Debit card skimming	Identity theft	Fake ATMs	Split deposits/ withdrawals	Unauthorised PIN access	Extortion	Unauthorised customer charges.	Registration with fake details.	Access of agent transactional data	Customer collusion with employee	Stand-alone or not	Age of business	Location	Number of working hours	Multiple businesses	Proximity to bank branch	Many banks
Spearman's rho	Counterfeit money	r	1.000																		
		p																			
	Fake SMS	r	-.030	1.000																	
		p	.742																		
	Debit card skimming	r	-.250**	.151	1.000																
		p	.006	.100																	
	Identity theft	r	.111	-.094	-.083	1.000															
		p	.229	.308	.372																
	Fake ATMs	r	.157	-.122	-.200*	-.056	1.000														
		p	.089	.185	.030	.542															
	Split deposits/withdrawals	r	-.120	.081	.068	-.063	-.119	1.000													
		p	.194	.380	.460	.496	.196														
	Unauthorised PIN access	r	.016	.107	.154	-.099	.063	.100	1.000												
		p	.861	.246	.094	.282	.498	.281													
	Extortion	r	.040	.151	-.010	.065	-.164	-.055	-.093	1.000											
		p	.663	.100	.914	.483	.074	.555	.315												
	Unauthorised customer charges.	r	.022	.137	-.124	.034	.059	-.053	.022	.098	1.000										
		p	.815	.139	.180	.714	.525	.564	.811	.288											
	Registration with fake details.	r	.008	.004	-.025	-.016	-.004	-.006	-.074	.123	-.107	1.000									
		p	.931	.969	.789	.859	.963	.948	.423	.183	.248										
	Access of agent transactional data	r	-.156	-.027	.037	.076	-.002	-.116	.114	-.106	-.049	-.018	1.000								
		p	.090	.773	.692	.410	.986	.208	.216	.252	.600	.845									
	Customer collusion with employees	r	.050	.132	.034	-.089	-.092	-.019	-.087	.152	.048	.070	-.154	1.000							
		p	.590	.152	.717	.335	.321	.838	.349	.099	.604	.452	.094								
	Stand-alone or other	r	-.001	.096	-.003	.067	.045	-.059	.010	.121	.044	.052	-.109	-.030	1.000						
		p	.991	.300	.974	.469	.625	.523	.915	.189	.638	.574	.239	.747							
	Ownership of the business.	r	-.081	-.127	-.003	.052	.063	-.075	-.002	-.040	-.079	-.002	-.080	-.071	.053						
		p	.383	.170	.973	.573	.499	.415	.984	.667	.396	.979	.389	.441	.567						
	Age of business	r	-.151	.020	.080	-0.176***	-.146	.222**	-.008	.008	0.051*	-.132	-.019	.063	-.114	1.000					
		p	.101	.832	.385	(0.055)	.113	(0.015)	.927	.928	(0.578)	.153	.838	.499	.216						
	Location	r	.102	-.073	.058	-.031	.100	-.120	.065	0.180*	.106	-0.161*	-.087	-.040	.031	-.096	1.000				
		p	.271	.427	.534	.741	.278	.193	.480	(0.050)	.250	(0.08)	.347	.665	.734	.299					
	Number of working hours	r	-.060	.051	-.005	-.097	.038	.028	-.007	-.056	.099	-.016	-.002	-.023	-.116	-.010	.141	1.000			
		p	.513	.581	.961	.296	.680	.765	.944	.547	.282	.866	.981	.806	.210	.913	.126				
	Multiple businesses	r	.010	-.009	-.087	-.024	.061	.075	-.146	.020	-.038	.010	-.023	.148	-.211*	.023	.097	.202*	1.000		
		p	.918	.924	.346	.799	.507	.415	.114	.831	.678	.916	.806	.109	.022	.808	.294	.028			
	Proximity to bank branch	r	.074	.002	-.065	-.069	0.173*	-.068	-.081	-.071	-.214*	.103	.203**	.136	-.060	-.096	-.123	-.062	.080	1.000	
		p	.422	.986	.485	.454	(0.059)	.461	.380	.441	(0.019)	.265	(0.027)	.140	.514	.297	.181	.506	.384		
	Many banks	r	.006	.116	.098	-.128	0.029	.123	0.166*	.008	.110	-.001	-.082	-.028	.034	-.061	.205*	.027	-.012	-.093	1.000
		p	.947	.208	.288	.164	.755	.184	(0.070)	.931	.235	.993	.378	.759	.717	.512	.025	.769	.894	.314	

***. Correlation is significant at the 0.01 level (2-tailed).

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

*. Correlation is significant at the 0.10 level (2-tailed).

4.6. Multivariate analysis

A multivariate data analysis is a statistical technique where more than one variable is analyzed (Frederick, 2013). It is a collection of methods applied to test variables in a sample (Rencher, 2001). The variables herein were investigated to test effectiveness in agency banking and their effect on activity levels. For purposes of this study, frequencies, factor analysis, and ordinal regression models were used.

4.6.1 Governance and leadership

This was measured in terms of how policies and procedures as well as management are engaged in fighting fraud. Looking at how clear the code of conduct was to the agents was also used. Many respondents felt that management played a huge role in fraud prevention. There was however some few people who felt that the policies and procedures were not very clear. This was mainly attributed to use of jargons that are not easily understood. As shown in appendix vii, Governance reported a high percentage in effectiveness.

4.6.2 Preventive measures

Appendix vii showed that all the surveyed agent banks had adopted preventive measures and they were very effective. Some went as far as installing CCTV cameras and having ultra violet lights which detect counterfeit notes. Agents ensure verification of customer identification. Some banks have hotlines that deal with fraud alerts. The banks also engage the agents in case there are new fraud activities through SMSs. This way the agents know what to look out for and remain vigilant.

4.6.3 Response

The manner in which banks respond to fraud occurrences in agent banks reported low percentages in term of effectiveness. Response was measured in terms of corrective checks and investigative procedures. When agents report fraud, they are not notified by the affiliate banks on the progress of the investigations. Most agents felt there is no need to report fraud as they get little or no feedback from the bank.

4.6.4 Detective practices

Detective techniques looked at whistleblowing, mystery shopping and surprise audits. The results showed there is laxity in terms of surprise audits by affiliate banks. This majorly contributed to the low percentage in terms of effectiveness. As much as whistle blowing is encouraged and done by agents, they feel that the banks do not respond in good time.

4.6.5 Monitoring and Training.

Most of the respondents were not satisfied with the training and monitoring by the banks on agency banking activities. Most employees did on the job training through the business owners. Agents were clueless on whether the banks are supposed to take them through any form of training.

4.6.6 Kruskal-Wallis Test and Pairwise comparisons.

The frequency tables (Appendix vii) on effectiveness of fraud risk management practices showed that governance, monitoring and detective compared better to response and monitoring. A Kruskal-wallis test was done to ascertain how the variables ranked against each other. According to Hole (2011) this test is an equivalent of the one way ANOVA for parametric data. It is appropriate for comparison of more than three conditions, if they are measured in an ordinal scale. Table 4.4 indicated that there was a significant difference in the medians, (d.f 4, N = 595, p =.000). After the significance was established, post hoc analysis was conducted to establish where the differences lie.

Table 4.6a: Pairwise comparisons

Variable 1 versus Variable 2	Test statistic	Significance	Adj. Sig
Governance vs. Preventive	1.482	.223	1.000
Governance vs. Response	25.790	.000	.000
Governance vs. Detective	21.857	.000	.000
Governance vs. Monitoring	60.639	.000	.000
Preventive vs. Response	13.043	.000	.003
Preventive vs. Detective	2.311	.128	1.000
Preventive vs. Monitoring	42.824	.000	.000
Response vs. Detective	4.695	.030	.303
Response vs. Monitoring	10.206	.001	.014
Detective vs. Monitoring	27.538	.000	.000

Asymptotic significances (2-sided tests) are displayed.
The significance level is 0.05

Table 4.6a shows a statistically significant difference between Governance and Response (Test statistic = 25.79, p value 0.000 < 0.05), Governance and Detective (Test statistic = 21.857, p value 0.000 < 0.05) and Governance and monitoring (Test statistic = 60.639, p value 0.000 < 0.05) but between Governance and Preventive there was no significant difference (Test statistic = 1.482, p value 0.223 > 0.05). There was a statistically significant difference between Preventive and Response (Test statistic = 13.043, P value 0.000 < 0.05), Preventive and Monitoring (Test statistic = 42.824, P value 0.000 < 0.05) but between preventive and detective there was no significance (Test statistic = 2.311, P value 0.128 > 0.05). There was a significant difference between Response and Detective (Test statistic = 4.695, P value 0.030 < 0.05) and also between Response and Monitoring (Test statistic = 10.206, P value 0.001 < 0.05). Between Detective and Monitoring there was significance (Test statistic = 27.538, P value 0.000 < 0.05).

The tests conducted to test pairwise comparisons showed that governance and preventive were not significantly different (p=.223) as well as preventive and detective (p=.128). All the other pairs were different; Governance and Response, Detective and Monitoring, Governance and Monitoring, Preventive and Response, Preventive and Monitoring, Governance and Detective all at p=.000, Response and monitoring (p=0.01), response and detective (p=0.03).

At 95% confidence level, the conclusion is that governance and preventive at (mean score = 1, median score = 1) each are the highest in effectiveness, followed by response and detective (mean score = 2, median score = 2) and monitoring ranks lowest in effectiveness (mean score = 3, median score = 3). This confirms previous results where, Governance, Preventive and Detective measures have different median levels when compared to other measures and therefore being most effective. They showed a .000 significance which is less than 0.05, leading to rejection of the null hypothesis that the distribution of the median across categories was the same.

4.6.7 Factor analysis

Factor analysis is a statistical procedure which tests previously correlated multiple variables with an aim of describing variability among them (Sweet & Martin, 2014). This is necessary because respondents often give similar answers to associated variables. A factor is the dimension which tries to show differences in the variables (Frederick H.Long, 2013). The factors are usually as many as the variables, and each individual factor captures some amount of the overall variance.

The study applied factor analysis to analyse effectiveness of fraud risk management techniques adopted in agent banks. Factor analysis operates on the notation that it retains the character and nature of variables, by reducing their numbers and hence simplifying the multivariate analysis (Yong & Pearce, 2013). Bartlett test was done and showed that the variables are significantly correlated (0.007, $p<0.05$) which provided a reasonable basis for factor analysis. From tables 4.6c amounts of variance in the original variances which are accounted for by each component are presented. The percentage of variance column shows ratio of the variance accounted for by each component to the total variance expressed as a percentage while the cumulative percentage column presents that percentage of variance accounted for by the first *n* components (Yong & Pearce, 2013). The first factor shows 15.102% variance, second 13.344%, third 13.043%, fourth 11.355% and fifth 10.021%.Scree plot presentation (figure 4.6) was used to determine how many factors should be retained. Eigenvalues are measures of variance that the factors explain (Frederick H.Long, 2013). Five factors were retained as they had Eigenvalue of more than 1. The component matrix shows extraction values and those with higher loadings are selected. A rotated component matrix which changes nothing but simplifies interpretation of analysis was done. Table 4.6c shows Process checks and management reported effectiveness at 0.713 and 0.858 respectively. Whistle blowing and customer identification were effective at 0.683 and 0.794. The other factors showed neutrality and ineffectiveness.

Table 4.6b: Results of factor analysis: Total Variance explained

Fraud risk management Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
Process checks	1.510	15.102	15.102	1.510	15.102	15.102	1.361	13.614	13.614
Training	1.334	13.344	28.446	1.334	13.344	28.446	1.276	12.757	26.370
Corrective checks	1.304	13.043	41.489	1.304	13.043	41.489	1.276	12.755	39.126
Know Your Customer	1.136	11.355	52.844	1.136	11.355	52.844	1.217	12.168	51.294
Whistle blowing	1.002	10.021	62.865	1.002	10.021	62.865	1.157	11.572	62.865
Monitoring & supervision	.926	9.264	72.129						
Mystery shopping	.826	8.260	80.389						
Management	.788	7.877	88.266						
Structured agent feedback sessions	.687	6.872	95.138						
Process checks	.486	4.862	100.000						

Fraud risk management and activity levels Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
Policies and responsibilities	1.681	24.017	24.017	1.681	24.017	24.017	1.524	21.764	21.764
Fraud reporting procedures	1.162	16.593	40.610	1.162	16.593	40.610	1.266	18.090	39.854
Fraud risk identification	1.076	15.374	55.984	1.076	15.374	55.984	1.129	16.130	55.984
Understanding code of conduct	.968	13.828	69.812						
Monitoring & training	.906	12.943	82.755						
Whistle blowing	.637	9.107	91.862						
Investigation procedures	.570	8.138	100.000						

Extraction Method: Principal Component Analysis.

Figure 4.6: Results on factor analysis; FRM scree plot

Scree plot presentation above was used to determine how many factors should be retained. Five factors were retained as they have Eigenvalue of more than 1

Table 4.6c: Results of factor analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.432
Bartlett's Test of Sphericity	Approx. Chi-Square	57.709
	df	45
	Sig.	.001

Rotated Component Matrix[a]

	Components		
	Proactive and Reactive	Reporting	Ethics and disclosure
Fraud risk identification	.785		
Monitoring & training	.651		
Policies and responsibilities	.554		
Investigation procedures		.805	
Whistle blowing		-.565	
Fraud reporting procedures			.738
Understanding code of conduct			.610

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

From above table, Bartlett tests showed that the variables are significantly correlated at 0.001, $p<0.05$, and rotated component matrix show correlation to activity levels.

4.7 Fraud risk management and level of activity by agent banks.

Factor analysis was done before the regression analysis. Bartlett tests in table 4.6c and extraction of variables was done and a residual matrix was calculated. This followed successive extraction to check whether there was a large enough variance accounted for in the correlation matrix (Brett, Ted, & Onsman, 2012). According to table 4.6c on variance summary with activity levels, the first three components showed 24.017%, 16.593% and 15.374% variability.

From the rotated component matrix in table 4.6c, fraud risk identification, monitoring and policies were highly correlated to activity levels at 0.785, 0.651 and 0.554 respectively. Investigative procedures and whistleblowing reported correlation at 0.805 and -0.565 while fraud reporting procedures and code of conduct showed 0.738 and 0.610 correlation respectively.

Having confirmed that there exist a relationship between the independent and dependent variable, an ordinal logistic regression was performed. According to (Long, 2012), an ordinal logistic regression is a statistical technique used to predict behaviour of ordinal level dependent variables with a set of independent variables. Thus the mehod was used because the dependent variable was in likert scale.

The model is thus defined as;

Activity levels= f{Fraud risk management practices+Fraud types+ Agent banks characteristics}

Before looking at the effects of the variables, there was need to test whether the model improved ability to predict the outcome. This was done by comparing a model without any of the variables (Baseline or “Intercept only” model) against one with all variables (Final). This comparison was to see which model significantly improved the fit to the data.

Table 4.7: Final Model

Model	-2 Log Likelihood	Chi-Square	Sig.	df.
Intercept Only	304.045			
Final	216.786	87.259	.023	63

	Chi-Square	df	Sig.
Pearson	817.093	291	1.000
Deviance	216.786	291	1.000
Cox and Snell			.520
Nagelkerke			.563

Model	-2 Log Likelihood	Chi- Square	df	Sig.
Null Hypothesis	216.786			
General	.000[b]	216.786	126	.000

a. Link function: Logit.
b. The log-likelihood value is practically zero. There may be a complete separation in the data. The maximum likelihood estimates do not exist.

Variables	Transactions Per week	Estimate	Std. Error	Expo.	Wald	df	Sig	95% level Lower Bound	Confidence Upper Bound
Preventive	vs <50	-13.060***	2.705	0.002	23.306	1	.000	-18.363	-7.758
Preventive	vs 51-100	-12.611***	2.683	0.003	22.092	1	.000	-17.870	-7.352
Preventive	vs 101-500	-12.749***	2.775	0.003	21.111	1	.000	-18.188	-7.311
Detective	vs <50	-17.897***	3.293	0.000	29.540	1	.000	-24.351	-11.443
Detective	vs 51-100	-16.052***	3.214	0.000	24.944	1	.000	-22.351	-9.753
Detective	vs 101-500	-18.071***	3.333	0.000	29.399	1	.000	-24.603	-11.539
Monitoring	vs < 50	17.147***	.666	0.895	662.583	1	.000	15.841	18.452
Fake ATMs		-1.793*	1.084	0.718	2.736	1	.098	-.332	3.917
Debit cards Skimming		-2.317***	.827	0.099	7.841	1	.005	-3.938	-0.695
Identity theft		-3.752***	1.210	0.023	9.621	1	.002	-6.123	-1.381
Unauthorized PIN access		2.224**	.915	9.24	5.908	1	.015	0.431	4.017
Imposing unauthorized customer charges		-1.411**	.721	0.243	3.837	1	.050	-2.824	0.001
Registration of customers with fake details		1.658***	.623	5.247	7.086	1	.008	0.437	2.878
Customer collusion with employees		3.464***	.906	31.934	14.627	1	.000	1.689	5.239

***P<0.01
**P<0.05
*P<0.10

The Model fitting Information table gave the -2 log-likelihood values for the baseline and the final models. A chi-square to test the difference between the 2LL for the two models was then performed. The significant chi-square statistic ($p = 0.023 < 0.05$) indicates that the Final model gives a significant improvement over the baseline/intercept-only model and thus gave better predictions. A goodness of fit test using Pearson's chi-square statistic and deviance chi-square statistic was done to test whether the observed data was consistent with the fitted model. The null hypothesis being that the fit is good, if the p value is large, the null hypothesis is not rejected. The results revealed ($p=1.00>.05$) thus the model does fit very well leading to conclusion that the data and the model predictions are similar, and the model is good. A further analysis of the goodness of fit was assessed using the Pseudo R squared. In the linear regression model, the coefficient of determination summarizes the proportion of variance in the dependent variable associated with the predictor (independent) variables, with larger values indicating that more of the variation is explained by the model. Two models (Nagelkerke and Cox & Snell) were used for estimating the coefficient of determination. The model with the largest statistic (56.3%) was considered.

The test of parallel lines was used to assess whether it is reasonable to make the assumption that parameters are the same for all categories. This test compared the ordinal model which had one set of coefficients for all thresholds (labelled Null Hypothesis), to a model with a separate set of coefficients for each threshold (labelled General). From the results in table 4.7 the null hypothesis was rejected (P value = $0.000< 0.05$).

The parameter estimates in table 4.7 summarized the effect of each predictor. The sign of the coefficients for factor levels give important interpretations regarding effects of the predictors in the model (Yong & Pearce, 2013). A factor level with a greater coefficient indicates a greater probability of being in one of the "higher" cumulative outcome categories. The sign of a coefficient for a factor level is dependent upon that factor level's effect relative to the reference categories.

From table 4.7 the risk practices which have statistically significant ($p=0.000<0.05$) relationship with activity levels are preventive, detective and monitoring measures. The particular fraud types in the table also have a statistically significant ($p<.1$and $p<.05$) relationship with activity levels of agent banks.

4.8 Chapter Summary

Respondents indicated that fraud is prevalent in agency banking. Results revealed respondents have experienced Fake SMSs (83.2% N=99), Extortion (74.7%), Fake ATMs (56.3%N=67), Counterfeit money & access of agent transactional data (53.8%), Unauthorised PIN access (53%) and registration of customers with fake details (51.2%). The other fraud types which were not as high in terms of frequency are Debit card skimming (47.1%N=56), Identity theft (47.9 N=57), Split deposits (47.18%N=57) unauthorised customer charges (41.1%). Interestingly even the fraud types, whose percentages were low, were reported by close to half of the respondents.

The correlation analysis showed that the number of years that an establishment had been operation had a positively significant relationship with split deposits and unauthorized customer charges. As the business matured, the risk of identity fraud reduced. Agent banks' proximity to bank branches revealed a positive relationship to fake ATMs and unauthorised access of agent data, but a negative relationship to unauthorized charges. Location had a significant correlation with extortion and registration of customers with fake details. Agent banks that acted for many banks recorded a high positive correlation to unauthorised PIN access.

Since the distribution of data was not normal, a non-parametric (median) test was done to check the relationship between the different fraud risk management practices. This was done by testing for differences or similarities between the practices. Factor analysis confirmed that risk management practices are sufficient to be analysed for effectiveness. This began by a hypothesis where the null hypothesis was rejected since $p=.00<0.05$, confirming that there was a difference between the medians across the categories. The Kruskal-wallis and pairwise comparison tests confirmed that risk management practices were different. Preventive, Governance and detective measures were found to be most effective in agency banking while Monitoring was found to be the least effective. Most respondents were unsure about effectiveness of the response practices. This agreed with (Ohando, 2014) who found that preventive, detective and management input play a major role in reducing fraud in Kenyan banks.

Finally the study sought to establish what effect the fraud risk management practices had on activity levels by agent banks. Results on factor analysis showed there was evidence of a

relationship between the practices and activity levels. An ordinal logistic regression showed that preventive, detective and monitoring measures had a statistically significant relationship to activity levels. These findings were also found by (Ezekiel & Isaiah, 2016 and Kedir & Adriana, 2016). Preventive and detective measures had a negative relationship with activity levels. This could mean that when customers are aware of stringent preventive and deterrents to fraud, they do not risk tricking the agents. If a customer is aware that an agent bank has ultra violet lights to test for counterfeit money, there is a likelihood that they will not try their luck with counterfeit notes. This could also be attributed to the argument that these measures usually show high positive relationships with performance of companies that invest heavily in intellectual capital (Ezekiel & Isaiah, 2016).

The fraud types which showed a negatively statistically significant relationship to activity levels were Fake ATMs Imposition of unauthorized customer charges, Identity theft and Debit cards Skimming. This agrees with previous studies that as activity levels increase in AB, some fraud types reduce because there is more awareness and understanding to what to look out for (Agalla, 2014; Alexandra, 2011; CGAP, 2006).

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of findings, conclusions and recommendations based on the research objectives and existing empirical literature. The chapter is organized in order of the study objectives. The primary objective was to investigate the effect of fraud risk management practices on activity levels by agent banks in Nairobi County. The specific objectives sought to establish whether there existed any relationship between fraud types and characteristics of agent banks. Also to find out which fraud risk management practices were adopted to curb fraud in agent banks and finally analyse the association between the practices and activity levels.

The background provided a detailed profile on the role of risk management and agency banking by highlighting what is known so far, the inconsistencies and contradictions. It was clear from the problem statement that there is a social and research problem in fraud risk management in agency banking. The study adopted a positivistic approach and a mix of descriptive and explanatory research designs for objectivity in describing characteristics and functions as well as following a structured research process. The population was the agent banks in Nairobi County and a hundred and fifty (150) questionnaires were distributed to agents. Data collected was checked for accuracy and completeness, edited, compiled. It was then tested for normality, multi-collinearity and heteroscedasticity and analyzed to answer the research questions using SPSS and Excel software.

5.2 Discussion of findings

Data was collected from one hundred and nineteen agent banks in Nairobi County. The findings of the study are as discussed below.

5.2.1 Association between fraud types of agent banks characteristics.

This was done using a correlation analysis. The results showed that age of the business had a high positive significant relationship with split deposits (0.015, $p<0.05$) and unauthorized customer charges (0.92, $p<0.1$). This was attributed to the fact that as agent banks mature, the employees or owners understand the business better and thus able to manipulate the system. This is in agreement with (Albrecht et al, 2006) who found that as businesses age, fraud

becomes more sophisticated but similarly the business owners understand tricks by fraudsters who in turn invent complex fraud types. Identity theft reported a significant negative relationship with age of the business (0.055, $p<0.1$). As a business matures, fraudsters learn new loopholes they can manipulate. This agrees with previous findings that fraud risk awareness should be a continuous process as fraud becomes more sophisticated (Bell & Jhang, 2011).

Proximity to bank branches had a significant positive relationship with unauthorised access of agent transactional data (0.027, $p<0.05$) and fake ATMs (0.059, $p< 0.01$). The further the agent bank is to a main branch, the higher the risk of exploiting customers. Similarly the further the main branch is, the higher the risk of use of fake ATMs. The nature of these results confirmed (Dias & McKee, 2010) argument on the need for consumer protection in branchless banking. There was a significant negative relation in proximity to bank branch with unauthorized customer charges (0.02, $p<0.05$). As proximity to bank branch decrease unauthorized charges increase. Location and extortion showed a positive significant relationship (0.05, $p<0.1$), and a negative one with registration of customers with fake details (0.08, $p<0.1$). This could be interpreted that for customers to be registered with fake details, there is laxity on the side of the agents who are supposed to verify customer information. Training and monitoring through surprise visits and mystery shopping by banks could help alleviate this as proposed by (Alexandra, 2011).

Acting on behalf of many banks had a positive significant relationship with unauthorized PIN access (0.71, $p<0.1$). This means that banks should work together as opposed to individually as they encounter same fraudsters due to not sharing the information amongst themselves. This was also found to be true in a study on fraud in the banking industry by (Akelola, 2012).

Age, proximity, location and acting for multiple banks showed relationship with different fraud types and therefore there is need to further examine what can be done to curb the fraud types to enhance performance.

5.2.2 Risk management practices adopted in agent banks.

The study sought to establish which risk management practices are adopted in curbing fraud related challenges in agent banks. They were ranked in order of effectiveness using frequency tables and factor analysis. Mode which was the most frequent score in the data set in terms of effectiveness was recorded. The percentages were Preventive (100), Governance (84.9),

Detective (39.5), Response (21.8), and Monitoring (13.4). This was in agreement with factor analysis which showed Process checks (0.713), management (0.858), whistle blowing (0.683) and customer identification (0.794) were effective. A hypothesis was done to check the relationship between the different risk management practices. The p value was 0.00 which is less than 0.05 and led to rejection of the null hypothesis (The medians are the same across the practices). To avoid making the type 1 error, further tests were done. The Kruskal-Wallis test showed there was significant difference between the five practices. A further pairwise comparison test was conducted. Governance with preventive (p=.223) and preventive with detective (p=.128) were not significantly different. All the other pairs were different; Governance and Response, Detective and Monitoring, Governance and Monitoring, Preventive and Response, Preventive and Monitoring, Governance and Detective all at p=.000, Response and monitoring (p=0.01), response and detective (p=0.03). This meant there was agreement between the statistical conclusions.

This means that the agent banks are very aggressive in preventive measures like verification of customer details and other technical issues in fraud fight. The code of conduct was clear to the agents but the policies and procedures set out by affiliate banks were not easily understood. The detective practices ranked low because the affiliate banks didn't participate as expected. The agents cited major competition by mobile companies like Safaricom who are very aggressive in surprise audits and mystery shoppers to ensure their agents are following what is prescribed. The respondents felt that response was not important because the banks never notified them on the progress of investigative procedures. In terms of training and monitoring the banks fail to offer support to the agents.

5.2.3 Fraud risk management practices and activity levels by agent banks

To analyse the impact of fraud risk management on activity levels, factor analysis was done followed by ordinal logistic regression. Factor analysis began with Bartlett test which showed there was a strong significant relationship between the variables at 0.001, $p<0.05$. The extracted sums of squared loadings showed 55.984% variance for three factors. The rotated component matrix showed fraud risk identification (0.785), monitoring (0.651), policies (0.554), investigative procedures (0.805), whistleblowing (-0.565), fraud reporting procedures (0.738) and code of conduct (0.610) were correlation to activity levels. This led to further analysis.

Regression analysis procedure started with model fitting information to determine if the model improves ability to predict the outcome. This gave a significant chi-square statistic ($p=0.023<0.05$) meaning the model would give better predictions than probabilities. This was followed by a goodness of fit test resulting to Pearson's Chi-square ($p =1.00 > .05$) and deviance chi-square ($p = 1.00 > .05$). Pseudo R Squared was done using two measures, and the one with larger values (56.3%) was picked as it indicated that more of the variation could be explained by the model. From the parameter estimates, preventive and detective measures had negatively statistically significant relationship with levels of activity ($p<.05$). This could mean that when agent banks put measures, fraudsters are scared of trying their tricks lest they are caught. Monitoring had a positive significant relationship ($p<.05$) with activity levels and therefore the affiliate banks should have measures in place for training and monitoring. If banks monitor the agent banks there will be increased customer confidence and this will entice them to deal with the agents. Some fraud types (Fake ATMs, Imposition of unauthorized customer charges, Identity theft and Debit cards skimming) had a negative statistically significant relationship with activity levels.

5.3 Research implications and recommendations

5.3.1 Policy recommendations

The findings of this study provide foresight to policy makers and regulators in the banking industry and the government towards achievement of the vision 2030 to create a vibrant and globally competitive financial sector. Respondents felt that banks use jargons and their policies are not easily understood. Policy makers should ensure that policies and procedures are understandable and banks do not exploit the agents as seen when agents have unauthorised access to customer transactional data. These findings should start a debate on whether all stakeholders are at play in enhancing financial inclusion through agency banking. The stakeholders in this are the customers, agents, banks, regulators and the government. There is a part that each of them should play to prevent and reduce fraud related challenges. The banks should deal with fraud as a sector as opposed to individually to reduce suffering from the same fraudsters.

5.3.2 Managerial recommendations

The study findings will be useful to bank managers. Bank managers in charge of agent banks should improve their training, monitoring and supervisory duties. The analysis identified poor monitoring, training and supervision of agents. Additionally, given the fact that most fraud is not reported due to poor response by banks, managers should ensure that this information is used to improve the areas that showed ineffectiveness. The managers can adopt mystery shopping, rewards for agents that perform well and scheduled training sessions. Banks should also ensure customer information is secure and punishment is taken against those who exploit customers. CBK (2016) had recommended a central data repository for agents but this did not happen. The aim was to prevent blacklisted agents from jumping ship to other banks and continuing with the same misconduct that led to their dismissal.

5.4 Contribution to knowledge

Prior studies focused on challenges in agency banking and fraud has been identified as one of them. This study contributes to literature by looking at the measures which are adopted by agent banks to fight fraud. It also investigated the relationships between agent banks characteristics and fraud types and linked the fraud risk management practices to activity levels. The findings form basis for further research in agency banking. Previous studies had not linked fraud risk management in agency banking to growth but this study did. The conclusion was that prevention, detection and monitoring affect level of activities by agent banks. When compared to previous research, this study adopted a larger sample size because agency banking is growing and so a larger sample would be more representative of the expanded model. After the normality test data was analysed in its raw form without transforming it to show normalcy. This led to adoption of non-parametric measures like ordinal logistic regression and Kruskal Wallis tests where previously simple regression and one way ANOVA were use respectively. The findings therefore were as a result of different methods of analysis in comparison to previous research.

5.5 Areas of further study

Since this study focused on agent banks, it would be necessary to investigate the measures taken by affiliate banks in curbing agency banking fraud. Further research should be done by focusing on other financial and operational measures as this study focused only on the number of transactions.

5.6 Limitations of the study

Some limitations were encountered during this study. Agent banks are located all over the county and given the time constraints it was not possible to study all of them. Nairobi County which is home to all the commercial banks which have adopted agency banking was therefore selected and thus the sample used was highly representative. Future studies need to gather data from other counties and compare to reduce cultural, institutional and other biases.

Since fraud is a sensitive issue, few people were willing to give any information. Most respondents sought to portray efficiency and thus held back on sensitive information. There were also limitations in terms of response rate. The response rate was 79% (119 out of 150) as opposed to 100% which would have given more comprehensive results. The fact that the study focused on agent banks' was also a limiting factor in that respondents thought the information was to be used by their competitors.

Agency banking is a fairly new model in Kenya having started in 2010. The empirical study done on the area in Kenya is limited compared to what has been done in foreign countries like Brazil, India and Latin America. This study borrowed and compared with similar studies from those countries.

Most agent banks conduct other businesses and as many small businesses do not have book keeping records in place. This was a major hindrance to accessing information since there were no records to be compared with the questionnaires.

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APPENDICES

Appendix I: Letter of introduction

Strathmore UNIVERSITY

27 November 2017

To Whom It May Concern,

Academic Reference for Karanja Norah Nyokabi– Student Number 66790

Strathmore University offers the Masters of Commerce (MCom) program. In their 2nd year of study, each student is required to work on a Research Thesis project. The project involves reading literature that relates to the research topic; data collection and analysis and finally preparing a written document of the research findings and recommendations.

Norah is requesting to gather information to be used in her research. She is accountable for all information extracted from you and ensure that it will be used for research purpose only and will be kept confidential.

The research is entitled "**EFFECT OF FRAUD RISK MANAGEMENT ON THE FINANCIAL PERFORMANCE BY AGENT BANKS IN KENYA.**"

We are looking forward for your co-operation and assistance to the above named student.

Yours faithfully

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Appendix II: Questionnaire

SECTION A: GENERAL INFORMATION

1. Kindly tick against your gender**.** Male [ ] Female [ ]

2. Age

Below 30 years ☐ 30- 39 years ☐ Over 40 years ☐

3. Kindly indicate highest level of education

O –Level [ ] Undergraduate [ ] Graduate [ ] Other ……

4. Tick appropriately

Owner [ ] Employee [ ]

SECTION B: FRAUD TYPES

5. Please rate the following fraud types in order of how often they occur with 1 being 'always' and 5 being 'Never'.

	Always (1)	Nearly always (2)	Often (3)	Rarely (4)	Never (5)
Counterfeit money					
Fake SMS					
Debit card skimming					
Identity theft					
Fake ATMs					
Split deposits/withdrawals					
Unauthorised PIN access					
Extortion					
Imposing unauthorised customer charges.					
Registration of customers with fake details.					
Unauthorised access of agent transactional data					
Customer collude with employee to defraud agent					
Others					

6. Rate how often you notify the affiliate bank(s) of fraud occurrences.

Very often (1)	Often (2)	Neutral (3)	Rarely (4)	Very rarely (5)

7. How satisfied are you with bank response to agency fraud?

Very satisfied (1)	Satisfied (2)	Neutral (3)	Dissatisfied (4)	Very dissatisfied (5)

SECTION C: AGENT BANK CHARACTERISTICS

8. The establishment has been in operation for?

Over 7 years [ ] 5 to 7 years [ ] 3 to 5 years [ ] 1 to 3 years [ ] Less than 1 year [ ]

9. Is it a stand-alone agent or it engages in other businesses?

☐ Stand- alone ☐ Not stand – alone

10. Ownership of the business.

Sole proprietor [ ] Partnership [ ] Private limited Liability company [ ] Other ……..

11. Please rate each of the following on how they influence occurrence of agency fraud with 1 being 'most influential' and 5 being 'least influential'.

	1	2	3	4	5
Age of business					
Location					
Number of working hours					
Multiple businesses					
Proximity to bank branch					
Acting on behalf of more than one bank					

SECTION D: FRAUD RISK MANAGEMENT TECHNIQUES

12. How clear are anti- fraud measures to you?

Very clear (1)	Clear (2)	Not sure (3)	Barely clear (4)	Not clear (5)

13. Rate how effective each of the following is in curbing agency fraud.

	Very effective (1)	Effective (2)	Neutral (3)	Ineffective (4)	Highly ineffective (5)
Management					
Know Your Customer					
Process checks					
Monitoring & supervision					
Whistle blowing					
Corrective checks					
Training					
Rewards for compliance					
Mystery shopping					
Structured agent feedback sessions					

14. Which of these measures do you take against fraud? Tick all correct answers

Ultraviolet light sensitive test ☐

CCTV cameras ☐

Customer identification/verification ☐

Verifying bank instructions ☐

Other(s) …….

15. How would you rate above measures in curbing agency fraud?

Very effective (1)	Effective (2)	Neutral (3)	Ineffective (4)	Highly ineffective (5)

16. How clear is the following in the business?

	Very clear (1)	Clear (2)	Less clear (3)	Not clear (4)	Very unclear (5)
Policies and responsibilities					
Fraud reporting procedures					
Fraud risk identification					
Code of conduct					
Monitoring and training procedures					
Whistle blowing procedures					
Investigative procedures					

17. How frequent are surprise audits and assessments done by affiliate bank(s)?

Always (1)	Often (2)	Sometimes (3)	Rarely (4)	Never (5)

SECTION E: AGENT BANKS FINANCIAL PERFORMANCE

18. How many transactions do you serve per week?

0-50 [ ] 51-100 [ ] 101-500 [ ] Above 500 [ ]

19. How would you rate the following measures against performance of the agent bank?

	Extremely influential (1)	Very influential (2)	Somewhat influential (3)	Slightly influential (4)	Not at all influential (5)
Policies and responsibilities					
Fraud reporting procedures					
Fraud risk identification					
Understanding code of conduct					
Monitoring & training					
Whistle blowing					
Investigation procedures					

20. Rate how each of these affect performance of the business?

	Very much (1)	Somewhat (2)	Undecided (3)	Not really (4)	Not at all (5)
Age of business					
Location					
Number of working hours					
Multiple businesses					
Proximity to bank branch					
Acting for more than one bank					

21. Rate the following support practices by affiliate banks on how they influence performance in agent banks with 1 being 'Extremely influential' and 5 being 'Not at all influential'

	Extremely influential (1)	Very influential (2)	Somewhat influential (3)	Slightly influential (4)	Not at all influential (5)
Training					
Assessment					
Inspection					
Surveillance					

Thank you for devoting your time to answering this questionnaire.

Appendix III: Correlation Matrix

			Counterfeit money	Fake SMS	Debit card skimming	Identity theft	Fake ATMs	Split deposits/ withdrawals	Unauthorised PIN access	Extortion	Unauthorised customer charges.	Registration with fake details.	Access of agent transactional data	Customer collusion with employee	Stand-alone or not	Age of business	Location	Number of working hours	Multiple businesses	Proximity to bank branch	Many banks
Spearman's rho	Counterfeit money	r	1.000																		
		p																			
	Fake SMS	r	-.030	1.000																	
		p	.742																		
	Debit card skimming	r	-.250**	.151	1.000																
		p	.006	.100																	
	Identity theft	r	.111	-.094	-.083	1.000															
		p	.229	.308	.372																
	Fake ATMs	r	.157	-.122	-.200*	-.056	1.000														
		p	.089	.185	.030	.542															
	Split deposits/withdrawals	r	-.120	.081	.068	-.063	-.119	1.000													
		p	.194	.380	.460	.496	.196														
	Unauthorised PIN access	r	.016	.107	.154	-.099	.063	.100	1.000												
		p	.861	.246	.094	.282	.498	.281													
	Extortion	r	.040	.151	-.010	.065	-.164	-.055	-.093	1.000											
		p	.663	.100	.914	.483	.074	.555	.315												
	Unauthorised customer charges.	r	.022	.137	-.124	.034	.059	-.053	.022	.098	1.000										
		p	.815	.139	.180	.714	.525	.564	.811	.288											
	Registration with fake details.	r	.008	.004	-.025	-.016	-.004	-.006	-.074	.123	-.107	1.000									
		p	.931	.969	.789	.859	.963	.948	.423	.183	.248										
	Access of agent transactional data	r	-.156	-.027	.037	.076	-.002	-.116	.114	-.106	-.049	-.018	1.000								
		p	.090	.773	.692	.410	.986	.208	.216	.252	.600	.845									
	Customer collusion with employees	r	.050	.132	.034	-.089	-.092	-.019	-.087	.152	.048	.070	-.154	1.000							
		p	.590	.152	.717	.335	.321	.838	.349	.099	.604	.452	.094								
	Stand-alone or other	r	-.001	.096	-.003	.067	.045	-.059	.010	.121	.044	.052	-.109	-.030	1.000						
		p	.991	.300	.974	.469	.625	.523	.915	.189	.638	.574	.239	.747							
	Ownership of the business.	r	-.081	-.127	-.003	.052	.063	-.075	-.002	-.040	-.079	-.002	-.080	-.071	.053						
		p	.383	.170	.973	.573	.499	.415	.984	.667	.396	.979	.389	.441	.567						
	Age of business	r	-.151	.020	.080	-0.176***	-.146	.222**	-.008	.008	0.051*	-.132	-.019	.063	-.114	1.000					
		p	.101	.832	.385	(0.055)	.113	(0.015)	.927	.928	(0.578)	.153	.838	.499	.216						
	Location	r	.102	-.073	.058	-.031	.100	-.120	.065	0.180*	.106	-0.161*	-.087	-.040	.031	-.096	1.000				
		p	.271	.427	.534	.741	.278	.193	.480	(0.050)	.250	(0.08)	.347	.665	.734	.299					
	Number of working hours	r	-.060	.051	-.005	-.097	.038	.028	-.007	-.056	.099	-.016	-.002	-.023	-.116	-.010	.141	1.000			
		p	.513	.581	.961	.296	.680	.765	.944	.547	.282	.866	.981	.806	.210	.913	.126				
	Multiple businesses	r	.010	-.009	-.087	-.024	.061	.075	-.146	.020	-.038	.010	-.023	.148	-.211*	.023	.097	.202*	1.000		
		p	.918	.924	.346	.799	.507	.415	.114	.831	.678	.916	.806	.109	.022	.808	.294	.028			
	Proximity to bank branch	r	.074	.002	-.065	-.069	0.173*	-.068	-.081	-.071	-.214*	.103	.203**	.136	-.060	-.096	-.123	-.062	.080	1.000	
		p	.422	.986	.485	.454	(0.059)	.461	.380	.441	(0.019)	.265	(0.027)	.140	.514	.297	.181	.506	.384		
	Many banks	r	.006	.116	.098	-.128	0.029	.123	0.166*	.008	.110	-.001	-.082	-.028	.034	-.061	.205*	.027	-.012	-.093	1.000
		p	.947	.208	.288	.164	.755	.184	(0.070)	.931	.235	.993	.378	.759	.717	.512	.025	.769	.894	.314	

***. Correlation is significant at the 0.01 level (2-tailed).

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

*. Correlation is significant at the 0.10 level (2-tailed).

Appendix IV: Regression Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[TRANSACTIONS<50]	-18.441	4.567	16.303	1	.000	-27.393	-9.490
	[TRANSACTIONS 51-100]	-14.886	4.556	10.675	1	.001	-23.817	-5.956
	[TRANSACTIONS 101-500]	-12.381	4.575	7.324	1	.007	-21.349	-3.414
Location	[governance_<50]	-1.011	1.004	1.013	1	.314	-2.979	.957
	[governanace_51-100]	0[a]			0			
	[response <50]	-6.234	4.930	1.599	1	.206	-15.896	3.428
	[response 51-100]	-6.283	4.702	1.786	1	.181	-15.499	2.932
	[response_101-500]	-5.632	4.750	1.406	1	.236	-14.942	3.678
	[response - >500]	0[a]			0			
	[preventive- <50]	-13.060	2.705	23.306	1	.000	-18.363	-7.758
	[preventive_51-100]	-12.611	2.683	22.092	1	.000	-17.870	-7.352
	[preventive_101-500]	-12.749	2.775	21.111	1	.000	-18.188	-7.311
	[preventive- >500]	0[a]			0			
	[preventive=5]	0[a]			0			
	[detective_=<50]	-17.897	3.293	29.540	1	.000	-24.351	-11.443
	[detective_=51-100]	-16.052	3.214	24.944	1	.000	-22.351	-9.753
	[detective_101-500]	-18.071	3.333	29.399	1	.000	-24.603	-11.539
	[detective_=>500]	0[a]			0			
	[monitoring_=1]	17.147	.666	662.583	1	.000	15.841	18.452
	[monitoring_=51-100]	16.585	0.000		1		16.585	16.585
	[monitoring_101-500]	0[a]			0			
	[COUNTERFEIT=1]	3.629	3.041	1.424	1	.233	-2.331	9.589
	[COUNTERFEIT =2]	1.239	1.198	1.069	1	.301	-1.109	3.587
	[COUNTERFEIT =3]	.807	1.084	.554	1	.457	-1.318	2.932
	[COUNTERFEIT =4]	1.793	1.084	2.736	1	.098	-.332	3.917
	[COUNTERFEIT =5]	0[a]			0			
	[COUNTERFEIT =1]	-.060	2.616	.001	1	.982	-5.187	5.067
	[Fake SMS=2]	-.595	2.625	.051	1	.821	-5.740	4.549
	[Fake SMS =3]	.921	2.583	.127	1	.721	-4.142	5.984
	[Fake SMS =4]	1.866	2.681	.484	1	.486	-3.389	7.120
	[Fake SMS =5]	0[a]			0			
	[Card skimming=1]	1.578	1.406	1.259	1	.262	-1.179	4.334
	[Card skimming =2]	-1.113	.896	1.542	1	.214	-2.870	.644
	[Card skimming =3]	-2.317	.827	7.841	1	.005	-3.938	-.695

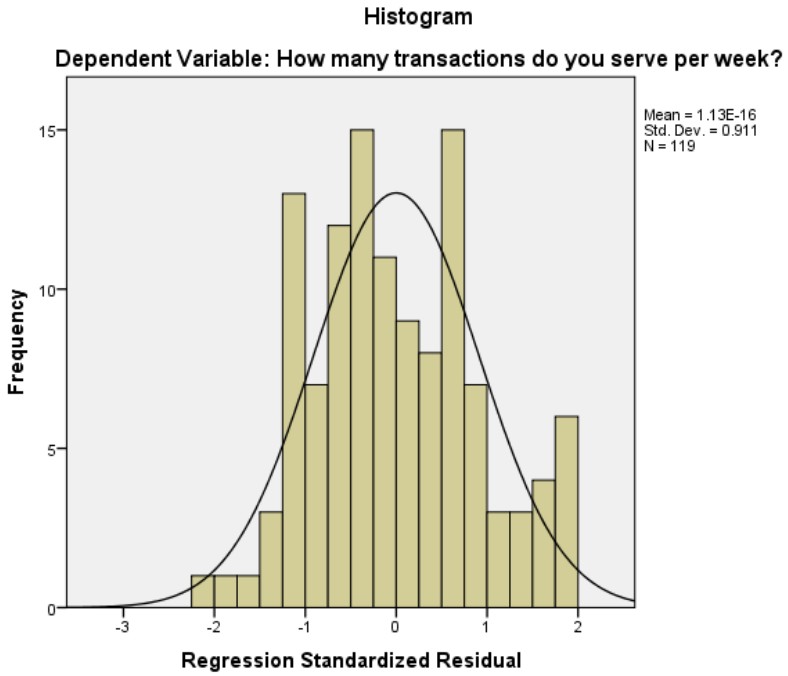
	[Card skimming =4]	-1.022	.691	2.189	1	.139	-2.375	.332
	[Card skimming =5]	0[a]			0			
	[identity theft=1]	-3.752	1.210	9.621	1	.002	-6.123	-1.381
	[identity theft =2]	.092	.832	.012	1	.912	-1.538	1.722
	[identity theft =3]	-1.285	.768	2.802	1	.094	-2.789	.220
	[identity theft =4]	.146	.706	.043	1	.837	-1.238	1.530
	[identity theft =5]	0[a]			0			
	[Fake ATMs=2]	1.214	1.588	.584	1	.445	-1.898	4.327
	[Fake ATMs=3]	2.067	.816	6.417	1	.011	.468	3.666
	[Fake ATMs=4]	-.210	.603	.121	1	.727	-1.391	.971
	[Fake ATMs=5]	0[a]			0			
	[Split deposits=1]	1.815	3.506	.268	1	.605	-5.057	8.687
	[Split deposits =2]	.876	.945	.860	1	.354	-.975	2.727
	[Split deposits =3]	-.466	.753	.383	1	.536	-1.943	1.010
	[Split deposits =4]	-.136	.732	.034	1	.853	-1.571	1.300
	[Split deposits =5]	0[a]			0			
	[Unauthorized PIN access=1]	1.508	1.262	1.428	1	.232	-.965	3.981
	[Unauthorized PIN access =2]	2.224	.915	5.908	1	.015	.431	4.017
	[Unauthorized PIN access =3]	2.855	.844	11.445	1	.001	1.201	4.509
	[Unauthorized PIN access =4]	1.477	.758	3.801	1	.051	-.008	2.962
	[Unauthorized PIN access =5]	0[a]			0			
	[Extortion=1]	.741	.975	.578	1	.447	-1.170	2.653
	[Extortion =2]	1.791	1.087	2.713	1	.100	-.340	3.922
	[Extortion =3]	-.413	1.007	.168	1	.682	-2.386	1.561
	[Extortion =4]	.986	1.035	.906	1	.341	-1.044	3.015
	[Extortion =5]	0[a]			0			
	[Unauthorized charges=1]	-.974	1.374	.502	1	.478	-3.666	1.719
	[Unauthorized charges =2]	.097	.908	.011	1	.915	-1.682	1.876
	[Unauthorized charges =3]	-1.051	.799	1.731	1	.188	-2.616	.515
	[Unauthorized charges =4]	-1.411	.721	3.837	1	.050	-2.824	.001
	[Unauthorized charges =5]	0[a]			0			
	[registration with fake details=2]	-1.266	1.994	.403	1	.525	-5.174	2.642
	[registration with fake details =3]	.536	.727	.543	1	.461	-.889	1.960
	[registration with fake details =4]	1.658	.623	7.086	1	.008	.437	2.878
	[registration with fake	0[a]			0			

details =5]							
[access of transactional data=2]	-1.965	1.431	1.885	1	.170	-4.770	.840
[access of transactional data =3]	.055	.758	.005	1	.942	-1.431	1.541
[access of transactional data =4]	-.663	.577	1.321	1	.250	-1.794	.468
[access of transactional data =5]	0[a]			0			
[collusion with customers=1]	-.668	1.467	.208	1	.649	-3.544	2.207
[collusion with customers =2]	1.736	.909	3.646	1	.056	-.046	3.517
[collusion with customers =3]	3.464	.906	14.627	1	.000	1.689	5.239
[collusion with customers =4]	1.882	.788	5.697	1	.017	.336	3.427
[collusion with customers =5]	0[a]			0			
[business Age=1]	.399	1.699	.055	1	.814	-2.931	3.729
[business Age =2]	1.567	1.609	.949	1	.330	-1.586	4.721
[business Age =3]	2.081	1.539	1.828	1	.176	-.935	5.097
[business Age =4]	.631	1.610	.153	1	.695	-2.524	3.785
[business Age =5]	0[a]			0			
[Stand alone or other=1]	.221	.571	.150	1	.699	-.898	1.339
[Stand alone or other=2]	0[a]			0			
[ownership=1]	-.847	1.004	.711	1	.399	-2.814	1.121
[Ownership=2]	0[a]			0			

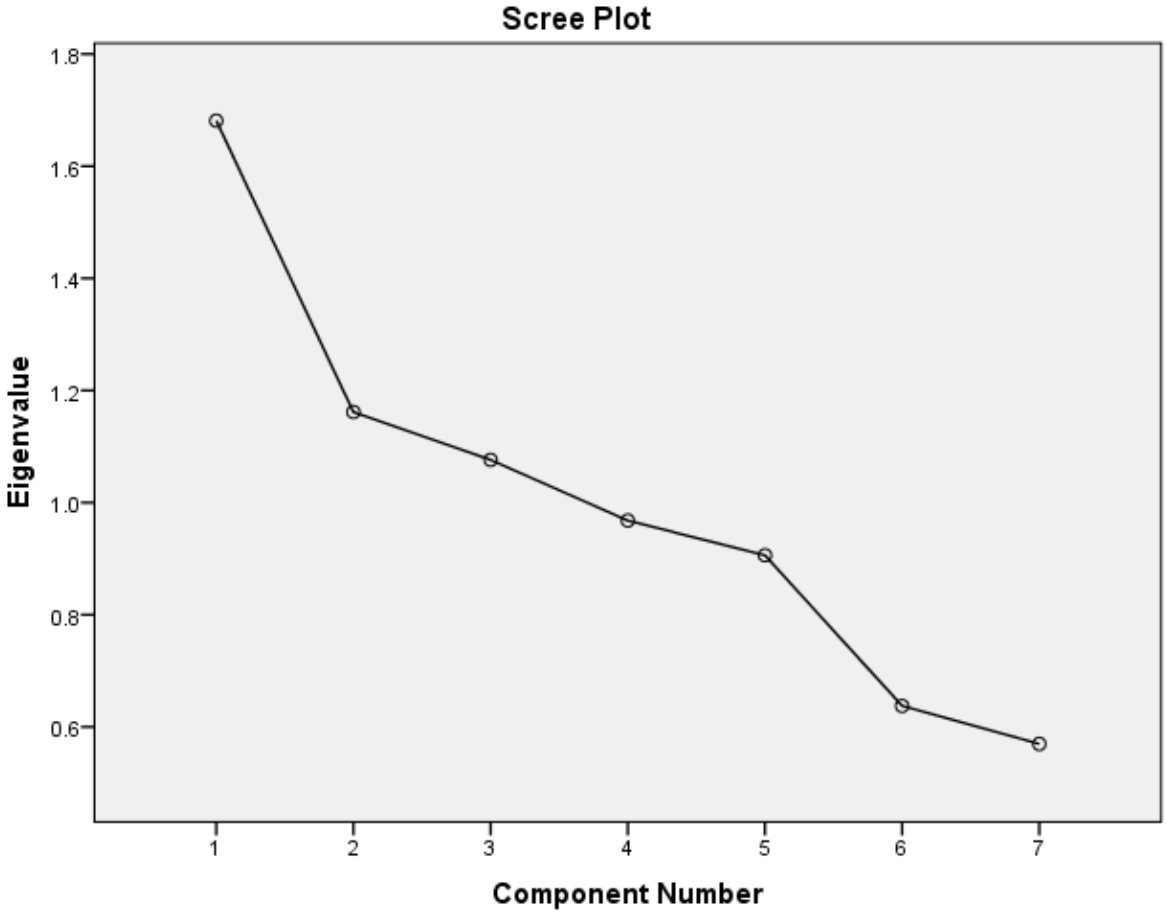
Link function: Logit.

a. This parameter is set to zero because it is redundant.

Appendix V: Histogram for normality test.



Appendix VI: Normal Probability –Probability plot for activity levels.



Appendix VII: Results on effectiveness of fraud risk management practices

Governance	Frequency	Percent	Valid Percent	Cumulative Percent
Very effective	101	84.9	84.9	84.9
Effective	8	6.7	6.7	91.6
Neutral	8	6.7	6.7	98.3
Ineffective	1	.8	.8	99.2
Highly ineffective	1	.8	.8	100.0
Preventive				
Very effective	119	100.0	100.0	100.0
Response				
Very effective	26	21.8	21.8	21.8
Effective	36	30.3	30.3	52.1
Neutral	48	40.3	40.3	92.4
Ineffective	8	6.7	6.7	99.2
Highly ineffective	1	.8	.8	100.0
Detective				
Very effective	47	39.5	39.5	39.5
Effective	11	9.2	9.2	48.7
Neutral	56	47.1	47.1	95.8
Ineffective	3	2.5	2.5	98.3
Highly ineffective	2	1.7	1.7	100.0
Monitoring and training				
Very effective	16	13.4	13.4	13.4
Effective	10	8.4	8.4	21.8
Neutral	79	66.4	66.4	88.2
Ineffective	9	7.6	7.6	95.8
Highly ineffective	5	4.2	4.2	100.0
Total	**119**	**100.0**	**100.0**	

Appendix VIII: Results on factor analysis; fraud risk management practices

Rotated Component Matrix[a]

	Component				
	Very effective	**Effective**	**Neutral**	**Ineffective**	**Highly ineffective**
Process checks	.713				
Training			.667		
Corrective checks			.063		
Know Your Customer		.794			
Whistle blowing		.683			
Monitoring & supervision			.729		
Mystery shopping			.696		
Management	.858				
Structured agent feedback sessions				-.529	
Rewards for compliance-3					.871

Communalities

	Initial	Extraction
Policies and responsibilities	1.000	.599
Fraud reporting procedures	1.000	.560
Fraud risk identification	1.000	.644
Understanding code of conduct	1.000	.376
Monitoring & training	1.000	.438
Whistle blowing	1.000	.577
Investigation procedures	1.000	.725