

**DIGITALIZATION AND SUPPLY CHAIN RISK AMONG  
COMMERCIAL BANKS IN KENYA**

**KENNEDY LUSENO VOREZA**

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UNIVERSITY OF NAIROBI.**

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## **DECLARATION**

This project is my original work and has not been submitted for a degree in any other University or institution for academic credit.

Signed.....

Date.....

**KENNEDY LUSENO VOREZA**

**D61/77234/2015**

This project has been submitted for examination with my approval as the University.

**Supervisor**

Signed.....

Date.....

**Supervisor: NANCY MARIKA**

Signed.....

Date.....

**Co supervisor: AKELO ERNEST**

## **DEDICATION**

I dedicate this project to my wife Esther Muema, our beloved daughters Asio and Esadyza and to my parents Mr and Mrs Voreza.

## **ACKNOWLEDGEMENT**

First and foremost I thank God for enabling me to bring this work to completion. My profound gratitude to my supervisors Nancy Marika and Akelo Ernest for guiding and encouraging me which has been of great value to this study. Special thanks to my wife Esther Muema and my daughters Asio and Esadyza for their love, enthusiasm and patience throughout the study period. Appreciation is also expressed to the staff of the 44 Kenya commercial banks for their contribution of primary data for the study. To these and others not mentioned here, may God bless you so much.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ATM-</b>	Automated Teller Machines.
<b>C.B.K-</b>	Central Bank of Kenya.
<b>S.C.R-</b>	Supply Chain Risk.
<b>T.A.M-</b>	Technology Acceptance Model
<b>P.U</b>	Perceived Usefulness.

## **ABSTRACT**

Banks in Kenya are changing their normal processes and are embracing new technology that is modern, effective and efficient. The process involves adopting of new technological and emerging financial technology in order to run their daily banking processes and functions. The purpose of this study was to assess digitalization and supply chain risk among commercial banks in Kenya. Objectives of the study were to establish digitalization technology used in Commercial in Kenya, to assess levels of Commercial Banks in Kenya Digitalization as well determining the effect of digitalization on Supply Chain Risk. The study was guided by Technology Acceptance Model (TAM) and Diffusion of innovation theories. The study used a descriptive survey research design where the target population comprised of 44 commercial banks in Kenya. Quantitative data was analyzed using descriptive statistics such as frequencies, percentages and mean while data was presented using tables. From the study it was established that; all commercial banks in Kenya use mobile phone application, the levels at which Kenya commercial banks have digitalized channels is very high, mobile phone application had significant ( $p < 0.05$ ) effect on supply chain risk, internet banking had significant ( $p < 0.05$ ) effect on supply chain risk and ATMs had no significant ( $p > 0.05$ ) effect on supply chain risk. From the study, it was concluded that; Kenya commercial banks have invested in mobile devices, phone and internet banking and use of ATMs, banking in Kenya have really changed in the recent times compared to how it used to be some years back and digitalization negatively affect supply chain risk through systems failure, hacking by fraudsters, IT security breaches unplanned interruption. This study recommends that: banks management should embrace and support a risk management system that will help having supply chain business continuity, banks should aim at training their customers on technology use and bank management should set funds to purchase back-up systems for continuity of digitalized services.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

Banks in Kenya are changing their normal processes and are embracing new technology that is modern, effective and efficient. The process involves adopting of new technological and emerging financial technology in order to run their daily banking processes and functions. Digitalization is an evolving process and involves technological inventions that promote new business ventures and to provide new opportunities. It involve shifting into digital business that involve the uniting and use of different technologies into everyday banking life. Digitalization of banks means the services of the bank are delivered over the web and any technological device that can allow transaction of services from the bank to the clients. This aims to provide a fast, convenient and a better experience than the normal traditional banking.

Digitalization is whereby processes are automated and internet and web based services are used to deliver banking products and transactions. Mobile phones applications, desk tops and Automatic Teller Machines are the major platforms the banks are using to digitalize its operations. There are Mobile Virtual Network Operator which provide a wireless communication services to other business partners. A good example the partnership between Equity Bank and Finserve. Finserve is used to provide secondary services to banks which include provisionof softwares, consultations, regulation of products to the Banking and Financial Service industry.

Supply Chain Risk (S.C.R) unites several initiatives for business development,growth and supply chain risks. Supply chain risk involve the minimization of intentional unauthorized acts intended to cause danger or damage to or by, the supply chain(ISO

28000:2007).Supply Chain Risk seeks to address acts and also enhance business growth and hence preventing any disruptions that may affects normal business activities ,operations or processes(ASIS International,2007; ASIS International and BSI ,2010). These events may be deliberate or non-intentional.

Kenyan banking industry is vital for economy and plays a crucial financial intermediary function. The institutions plays a role in the national growth and such roles are growing day by day (Wanjiru & Njeru, 2014).The Kenyan banking sector function as a financial intermediation between borrowers and savers that entails the mobilization of capital from individuals with surplus cash and channeling of funds to the deficit economic units(Kimutai & Jagongo ,2013). Most of the banks have continued to grow and this has led to increased threats notably from the service providers and the customers. Therefore to minimize the risks, the banks have turned into technology and digitalization to minimize the supply chain risk.

### **1.1.1 Digitalization**

Digitalization involve more than going paperless. Banks are offering excellent customer service and effective and efficient channels of service. Digitalization combines two bank environments; a customer experience which is outside the bank and the inside bank environment which is the efficient and effective operating model which enable technologies structures and processes. The step to digital banking and digitalization is adding to the existing products and services by offering new technology to improve convenience to customers. Examples are the use of mobile application and personal finance management tools. According to report by Central Bank of Kenya (2016), mobile banking

and Personal Finance Management are well received by consumers with download rates reaching over 40% of the customer base in most banks. Banks have invested in social networks, mobile devices, phone and internet banking and harmonized internal data to push financial technology. Mpesa has been a revelation and serves as an alternative bank institution. To leverage on this most banks have partnered with Safaricom in order to reach to the unbanked masses and also enable client to transact and move money from their phones into the bank accounts or vice versa. There is also an introduction of Omni-channel experience which involve replacing the traditional branch –based model with integrated channel approach which involve clients banking seamlessly by initiating a banking transaction in a branch and finalizing it in a phone. This is a virtual relationship that enhance self-service. This is working well with customers who have joint accounts or an account with several agents and as one person can initiate a transaction from the bank and the rest can approve or decline via their phones.

Kenya is globally regarded as a Digital Finance Service success story. This is largely because of the use of mobile technology which has been driving financial inclusions in Kenya. Recent survey done in 2015 by Brookings Institute, a US-based think tank, Kenya was ranked top overall due to its high score in financial inclusion majorly due to the development of its digital finance services. Mobile financial services have really boosted the adoption of technology, which has led to increased financial technology in the Kenyan Banks. Strong financial services and products are being offered to customers via mobile phones and other internet devices.

There are four trends in banking technology and digitalization. Cloud computing which involve storing and sharing of data on large clusters of internet servers rather than at the

customer's premises. In addition to cloud computing banks have big data and analytics which means they have to organize and use it in artificial intelligence which help to understand the customers' needs and habits. This involve mixing of the data with location-based technology and the smart phones which enable one to shop in nearby stores. The bank also have incubators which they partner in developing technology that will help them understand their customers. Lastly, new ways to pay through contactless payments for credit and debit cards which involve use of smart phones and other mobile devices that use radio frequency identification and near field communication which help clients during transaction processing.(Economic banking report,2015)

To be honest digitization of banking sector in Kenya is in its early stages of transformation. As technology evolve and change, many products and services in the banking sector will change in Kenya. Financial Technology is a changing trend that continues to combine financial expertise and technological innovation hence promoting digitalization.

### **1.1.2 Supply Chain Risk**

C.Fang et al, (2008) elaborates supply chain risk as disturbance in the flow of information and material goods from the supplier to the final product user. Supply chain.Mismatch between supply and demand creates Supply Chain Risk.Risk origins include environment, organizational or supply chain partners variables which cannot be determined with surerity and its impacts on the supply chain variables. These risk effects are important to supply chain variables which include quality or costs and the forms in which they become manifested (LaLonde, 1997).

Supply chain risk is grouped into two major foundations- Micro risks and Macro risks. The same is categorized as tragic and operative by Sodhi, Son, and Tang (2012) and disruption and operational by Tang (2006) Macro-risks are external happenings or situations that affect companies negatively. Macro-risks are environmental risks (environmental disasters), human risks (terrorism and politics). Micro risks are frequent events coming from in house actions of companies and the relations with partners within the chain of supply. Lack of accountability in the supply chain is an issue and therefore most organizations specifically banks in Kenya do not have the full visibility of the risks within their supply chain.

Supply chain risks has several forms (Harland, 2003; Morgan, 2004) and therefore limitations in knowledge about these risk creates a problem in risk prevention and minimization. Researchers Finch, Norrman & Jansson (2004) grouped various supply chain risks which includes; disruptions which are dangerous and are like natural disasters and of late terrorism related. It is impossible to do away with such risks but organizations can develop alternative plans to prevent and minimize the effects of such risks.. If anyone in the connections of a supply chain is made to wait, then the supply chain will be affected.

With today's vastly networked environment, risk of system failure an important issue for supply chains. Everyone working in the domain of supply chain management must know the "bullwhip effect" which is the consequence of non-availability of correct data to all the connections of supply chain. Infrastructural, political and cultural variances and the leanings towards policies like outsourcing and lean practices have increased risks in supply chain (Juttner et al., 2003; Varma et al., 2007; Meixell and Gargeya, 2005).

The reliance on technology should help the organization to manage complex, global supply chains in order to minimize the risks. This with the help of having supply chain business continuity that enable good practices that create resilience, the organization management leadership should embrace and support risk management. The key areas to consider include political and civil unrest, laws and regulations, terrorism, natural disasters and technology. When these key areas in consideration, Supply chain risk management will be a tactical issue that need to be focused on by the supply chain team while the senior management to be concerned with strategic risks around the supply chain. Effective supply chain management is important for many organizations. However, it is a skill and capability that many organizations have not yet developed.

In Kenya the problems are not well defined and the practices too. Therefore, it is fair to say the field is still evolving. With digitalization the banks are outsourcing some of its functions. These functions include the normal daily money transactions to key functions like finance, internal audit and human resource. These functions hence make the banks be susceptible to risks majorly from the external environment. Sharing of the banks data with the external service providers or even between banks increases the risks to the banks.

Digitalization makes it possible for these transactions from one bank to another to be possible. It has also linked the bank to other institutions that deal with money transfers. A good example in Kenya is the partnership the banks have with Safaricom through Mpesa channels and also other institutions (mobile network operators (MNOs)) that offer their services to the bank. Sharing of data increases the risks the bank faces hence the need for proper supply chain risk. The risk will have an effect on the organization. This include a



loss of productivity; an increase in customer complaints; damaged brand, rising costs of business to remediate issues and the impact on cash flows which will really affects an organization like a bank that depend on customers cheap deposits to lend for a profit. Therefore, it means banks should take supply chain risk as a key component of the organization.

Several tools and techniques should be used to manage these risks. These include having lesson plans, evaluation of staffs, having supply chain management risk policies and framework within an organization, supply chain controls, having an auditable risk management system and managing the entire supply chain effectively.

With the named tools and the technique that are used in risk management, the banks should have the following key processes in management of supply chain risk: risk identification whereby one needs to understand where the risks are, risk assessment by deciding how critical they are on the organization, risk treatment and how to strategize on how to manage risks and lastly risk monitoring which involve organization understanding changes in supply chain and being aware of issues before they become a problem. For banks, the major issue when it comes external service providers is the confidentiality of the clients' data, security and privacy. Most of this vendors offer technological assistance to the banks in managing their data and information. The most important part of managing supply chain risk in Banks start with vetting, evaluating and assessing the risk that they possess to the bank and its customers. For the banks that procure information technology services cyber risk survey should be done to assess the compliance of the service provider with the I.T security standards of the banks.

### **1.1.3 Commercial Banks in Kenya**

Commercial Banks in Kenya According, CBK's directory there is forty-four commercial banks in the country. The headquarters of these banks are in Nairobi and they serve both retail and corporate customers. The banks in the country perform the following function: creation of money, community savings, ensure smooth support of payment mechanisms, ensure smooth flow of international transactions, storage of valuable goods and provision of credit services. The Central Bank of Kenya falls under Treasury docket, is accountable for the formulation and execution of monetary policy and foster of liquidity and proper operations of Kenyan commercial banks. This policy formulation and implementation also include commercial banks financial risk management and financial performance (Central bank of Kenya, 2015).

The Kenyan banking sector has undergone many regulatory and financial reforms in the past. For example last year the financial market was hit by the capping of interest rate law. Such reforms have brought in so important changes to the banking sector as well as inspiring foreign banks to enter the Kenyan market (Irungu, 2013). The banking sector is governed by the Banking Act and so on including Prudential Guidelines. Commercial banks in Kenya are required by CBK to submit audited annual reports, which include their financial performance and in addition disclose various financial risks in the reports including liquidity risk, credit risk and so on, as well as management of credit risk. Effective management of credit risk practices involve reporting, reviewing to ensure credit risks well identified, assessed, controlled and informed responses are well in place by commercial banks. When the loan is issued after being approved by the bank's officials,

the loan is usually monitored on a continuous basis to keep track on all the compliance issues/terms of credit by the borrower (CBK, 2015)

Commercial Banks in Kenya has several benefits to the country and its citizen. Banks provide employments to the Kenyan citizens through skilled and unskilled work. Commercial banks contribute to a great extend to the Growth Domestic Pr of a country through provision of credit facilities to their customers .This is used as capital in various businesses which in the long run contributes to the GDP of the country.

## **1.2 Research Problem**

Supply chains have experienced major changes in the recent past, and are still unsettled. Demand vagueness in both level and scheduling has made the roles and accountabilities in the supply chain to change and this is being accelerated by information technology leading to initially unclear borders (Agrell, 2002) The strong evolution and alliances between suppliers, leads to changes in the power and alternative business reasoning and action among the business actors. Significant supply chain disruption can reduce company's revenue, drop into market share, increase cost and negatively impact production distribution. (Ruud, 2006).

Banking in Kenya have evolved lately compared to how it used to be some years back. Banking industry especially in emerging countries has witnessed a momentous developments over the preceding few years (Al-Jarrah, Ziadat & El-Rimawi, 2010). Banking sector has experienced important modifications due to rising high-tech creative innovations and the forces of globalization have accelerated creation and growth of opportunities as well as challenges to bank's stakeholders to ensure banks remain

profitable and competitive (Scott & Arias, 2011). As such, banks face more high degree of supply chain risks compared to other business. Such risks affects the bank's profitability (Adeusi, Kolapo & Aluko, 2014).

Various studies have been carried out related to this topic of study, Globally, Mogd and Banwet (2006) studied on Supply chain risk mitigation: modeling the enablers whereby the study presented an method to effective supply chain risk alleviation by explaining the changing aspects between various partners that help to moderate risk in a supply chain. The results of the study indicated that there exists a group of enablers that have a high driving influence and low dependence that needs extreme keenness and of strategic importance while another group of variables which have high necessity and are the subsequent actions.

Yong and Zou (2009) did a case study on the influences of product design changes on supply chain risk. The objective of the study was to look at the effects of product design changes on supply chain risk, and to look at the supply chain risk scopes in the Chinese special-purpose vehicle (SPV) industry in the background of product design amendments. The results indicated that effect of product design and product intricacy separately affect supply chain risk and business entity profitability.

Johah and Malim (2016) studied on the digitalization of retailing: an exploratory framework. The study objectives were to look at the occurrence of digitalization of retailing by developing a conceptual outline that can be used to supplementary define current alterations of the retailer consumer edge.

Locally, Ngugi (2013) researched on supply chain risk management practices in mobile telecommunications area industry in Kenya. The results indicated that challenges faced while implementing supply chain risk management are as a result of high investment costs in terms of technology and lack of government support .In addition personnel security reviews and enhanced perimeter defense system as the main supply chain risk management.

Musungu (2015) studied on supply chain risk management practices among telecommunications equipment sellers in Kenya by doing a case study of Nokia Kenya. The aim of the study was to Identify the main Supply Chain Risks faced by Nokia Kenya and to establish the barriers to adopting SCRM practices by Nokia Kenya .The researcher used questionnaires in data collection. This was a case study of Nokia Kenya. The findings indicated that supply chain risks faced by Nokia include currency fluctuations, quality, taxes, customs, and other regulations, regulatory approvals as indicated and physical theft.

Munyoki (2016) studied on supply chain risk management and competitiveness of automotive tyre retailers in Nairobi city county. The objective of the study was to ascertain the supply chain risk management practices and the challenges faced by tyre retailers in Nairobi County. The findings indicated that the retailers operating within Nairobi City County have some strategies in place that enable them mitigate risks in order to remain competitive.

From these studies above its evident that no study has been done on digitalization and supply chain risk in commercial banks in Kenya. This study tries to find answers to the following research questions: What are various digitalization Technology used by

Commercial banks in Kenya? What are the risks the technology brings to the banks? Lastly, what are the effects of digitalization on Supply Chain Risk?

### **1.3 Research Objectives**

1. To establish digitalization technology used in Commercial in Kenya
2. What levels have Commercial Banks in Kenya Digitalized?
3. To determine the effect of digitalization on Supply Chain Risk.

### **1.4 Value of the Study**

The study might benefit the bank's managers as they might use the findings to plan on how to mitigate risks in their organizations. In addition, the managers might adopt the recommendations to train the supply chain departments and administration so that they are in a position to manage their risks well especial on Banks that transact most of their business through Mobile Network Operators.

The findings might also be of value to other firms in the banking industry in Kenya like Saccos, microfinance organizations, insurances, cooperative societies and pension fund firms who operate similarly to commercial banks in understanding the risks involved when the organizations go digital.

The study findings will also be of value to various policy making organizations in Kenya including the C.B.K, the Kenya Bankers Association and other 11 regulatory authorities to generate policies, which will help in initiation of framework that will help to improve the overall security of banks and other institutions regulated by them.

The findings will also be of importance to literature, as it will add on to the existing literature on digitalization of Kenyan Banks and Supply Chain Risk Management. Finally, future scholars and researchers may use these findings as a stepping stone for additional research.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

The section summarizes the literature on digitalization by different intellectuals across the globe and in Kenya. The chapter describes the theoretical literature reviews which explore the various theories both technical and human that are related to digitalization and supply chain risk management. It also deals with reviews of the empirical literature and summarize the reviewed literature.

### **2.2 Theoretical Framework**

A theory refers to thoughtful and sane type of intellectual thinking and the result that come from such thinking. It offers framework and basis for opinion and from norms, hypotheses can be verified to provide backing or contest to the theory. Studies related to digitalization and SCRM cannot be exhausted without looking at models of Information Technology acceptance and post acceptance results.

#### **2.2.1 Technology Acceptance Model (TAM)**

Technology Acceptance Model (TAM) model examines at the elements of consumer reception of end-user computer technologies. It expounds on two theoretical ideas: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that determine the adoption and the purpose to use of a technological system. TAM has been used as abstract for explaining ICT acceptance and its usage. Scholars have confirmed that Percieved Usefulness has a positive connection with both adoption intention (Galera et al., 2011) and continuance intention (Romi et al., 2013). In other studies, Perceived Usefulness has been confirmed to effect consummation (Nakata and Berger, 2013) and approach toward the technology. PEOU impact PU and adoption intention. TAM has been legal academic



framework in reviewing I.C.T adoption and use but it has limitations which include the generality and parsimony of original model's, not considering non-organizational set up and overlooking the regulating effects of ICT adoption and its usage different circumstances (Sun & Zhang, 2006).

The theory explains what banks consider in adoption of technology and rolling it out to the customers. They look at the users of the technology and what they will require and need in order to fully adopt the technology. The process that the process of invention to the adoption of the technology to the acceptance of the technology by users who include the management, staff and the customers.

### **2.2.2 Innovation Diffusion Theory**

According to Mahajan and Peterson (1985) defined an innovation as an idea, object or practice that is seen new by the population of the social using the idea. Diffusion of innovation is the manner which the invention is transferred through networks over time among participants of social organizations. Clarke (1995) explains and describe how new discoveries in this case internet and mobile banking is accepted and becomes successful.

Sevcik (2004) noted that not all inventions are accepted easily even if they are noble. It at times take long for it to be adopted. Resistance to change prevent quick adoption of innovation though it might not stop the invention but slow it down. Rogers (1995) recognized five traits: relative advantage, compatibility, complexity, triability and observability as which impact the rate of adoption. He explained that adoption of new innovations depends on how an organization recognizes its relative advantage, compatibility, triability, observability and complexity.

If the bank sees the benefits of digitalization they will accept the technology holding other factors such as the availability of the technology constant. Acceptance of technology is quicker and more in establishments that have access to internet and the relevant divisions.

### **2.3 Digitalization**

With digitalization of the Kenyan banks and the economy going digital too, organizations can no longer ignore technology. Mobile banking applications and internet banking will be part of the daily processes of the organizations. These channels include: Unstructured Supplementary Services Data (USSD). In 2009 Standard Chartered launched its mobile banking in seven African countries including Kenya where it offered several services on a distinctive, easy platform called Unstructured Supplementary Services Data (USSD) and is accessible on Global System for Mobile Communications (GSM) carrier networks which customers can get services in real time, anyplace in the world, via their phones. This is an easily usable application that is not reliant on specific phones and do not need to be installed on the users phones.

Equity Bank have Eazzy 24/7 Mobile application which is an M-banking platform that involve downloading an App on your smartphone and using the application to transact from your account. The application links your accounts to other mobile money platforms like Mpesa and other banks accounts. The bank also has Equitel. This is a platform used by a customer to manage transactions and enable the client to still communicate. The line gives the customer his/her financial dealings as well as enable him/her to make calls, send messages and browse the internet. Enables you to control your joint, group or chama

account via a customer's phone. The client is able to transact anywhere any place because your Personal Identification Number (PIN) is your signature.

Most commercial banks have Cards. Smart cards are plastic devices with entrenched combined track used for payment of financial responsibilities. The cards can be used as a Credit Card, Debit Card and ATM cards. The pre-loaded cards with cash value can be used like cash and stock financial data on a microchip. The card has security plans which guard dealings among several card users. The card is used at the point of Sales (POS) for payments of goods and services and just like in cash transactions, it does not need other parties. The system does not require clearing hence transactions are real time. Recent development involves swiping of cards while doing payments and currently a client is able to scan a transaction via his/her VISA branded cards and make payments. The bank also shares payments platforms and some share ATMs.

## **2.4 Supply Chain Risk**

Durowoju, Chan, and Wang (2012) investigated disruption of critical information in operations in factories by discrete-event simulation. They found out that the retailer experiences improbability in the supply chain. The stock cost is the greatest irregular cost quantity whenever a breach happens in a system. The study involved looking generic information technology risk. There were risk factors that were identified nor enumerated. Wagner and Neshat (2010) and Berle, Norstad, and Asbjørnslett (2013) both assessed supply chain vulnerability. Wagner and Neshat (2010) made a conclusion that chain managers could reduce disruptions and their impact if they are capable of assessing and dealing with vulnerability in supply chain.

There is an increase in amount of research in the area of Supply Chain Risk however most of them are theoretical in nature. For example, several of Supply Chain Risk management methods and conceptual structures have emerged, however, they have not been authenticated empirically. The research therefore wants to look at the key areas in supply chain risks. It will look at elements like systems failure, system downtime, hacking and fraud, loss of key data for both clients and banks and lastly the total system failure due to security breach by external parties.

## **2.5 Digitalization and Supply Chain Risk**

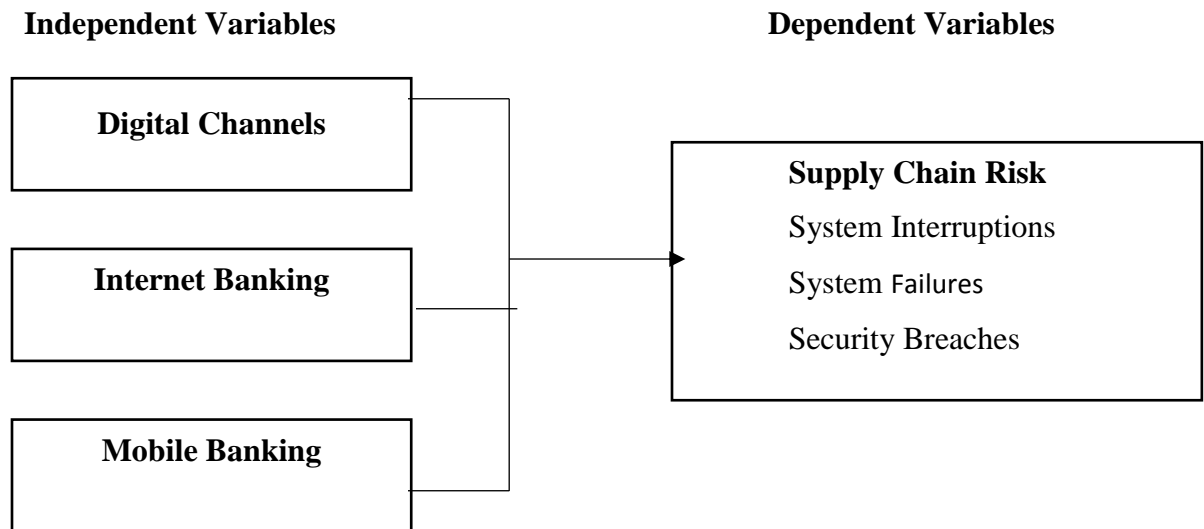
Over the last years, several industrial trends (e.g. outsourcing, just-in-time deliveries, shorter product life cycles) led to an increase in supply chain vulnerability (Norrman and Jansson 2004). A supply chain disruption and a resulting glitch (supply and demand mismatch) can have serious cascading effects on all supply chain members. Faisal et al. (2006) have empirically shown the benefit of information sharing of supply chain members to understand the different risks, which could have an impact on the supply chain.

The research will be looking at the digitalization process, the channels used by the bank in the process of digitalization, the risks these channels brings to the commercial banks using them and the levels of technological advances the banks have made and lastly the effect digitalization has had on the supply chain risk among commercial banks in Kenya. Risks can be micro or macro. For banks the following elements of supply chain risk is faced: System hacking by external environment, slow or total shut down of the core banking systems, data and money loss.

## 2.6 Conceptual Framework

The study seeks to evaluate digitalization of Kenyan banks and the effects on Supply Chain Risk Management. The variables involved include digital channels/type of digital channels, risk of the technology and the effects they have on the Supply Chain Risk.

**Figure 2.1: Conceptual Model**



**Source (Researcher Data)**

## 2.7 Summary of the Literature Review

In summary the study explored Technology Acceptance Model (TAM) model examines at the elements of consumer reception of a wide range of end-user computing technologies. It identifies two theoretical ideas including Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that determine the adoption and the purpose to use of a technological system. Acceptance Model (TAM) theory explains the determinants of user acceptance of a wide range of end-user computing innovations and technologies. TAM uses two theoretical constructs which include Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that determine the intention to use a system. Lastly diffusion of innovation theory

explains and look the process of how new technological inventions in this case digitalization of banking which involve use of mobile phones,ATMs and Internet Banking and how these technologies are adopted,accepted and used by the banks to maximize profitability.

## **CHAPTER THREE:RESEARCH METHODOLOGY**

### **3.1 Introduction**

Methodology guides the researcher in data collection, analyzing and interpreting of observed facts (Bless and Achola, 1988). The chapter presents the logical context to be trailed in the procedure of conducting the study. It covers: research design, population and sample, data collection and data analysis.

### **3.2 Research Design**

The study used descriptive research design. Cooper and Schindler, (2006) the design answers the questions such as who, how, what which, when and how much .A descriptive study was keenly designed to ensure comprehensive explanation of the circumstances with minimal bias in the collection of data and reduction of errors when interpreting collected data. This study was guided by three independent variables; mobile banking, internet banking and digital channels. The design enabled the researcher to collect wide and deep information about the population being researched on.

### **3.3 Population of Study**

Population of interest for this study is the 44 banks operating in Kenya (Central bank of Kenya 2017) as attached in Appendix ii. The study population is small, a census will be appropriate.Data collected through census method gives opportunity to the researcher to have an intensive study about a problem and enables the researcher gather knowledge.It has higher accuracy.

### **3.4 Data Collection**

There was use of primary data which was collected by use of questionnaires. The questionnaire had three sections as follows: Section A contained the background information, Section B contained Digitalization Channels and the risk the channels brings to the banks and finally Section C covered the effect of digitalization on supply chain risk of commercial banks in Kenya. The managers, I.C.T personnel and procurement officers were targeted as respondents since they have the information sought on various commercial banks. Secondary data was used through looking at the bank's annual and quarterly reports whereby the transactions carried out via mobile platforms were found.

### **3.5 Data Analysis**

General information was analyzed using descriptive statistics. Information the various digitalization channels adopted by the commercial banks in Kenya was analyzed using descriptive statistics that elaborated the channels the bank used most which involved looking at Mobile banking and Internet banking and the risk these channels brings to the bank and finally the effect of digitalization on supply chain risk of commercial banks in Kenya was analyzed using linear regression analysis where by the independent variables internet banking and mobile banking were analyzed against the depended variable supply chain risk which included elements like system failure, system security breaches and system disruptions and their causal effect was determined.

#### **3.5.1 Analytical Model**

In establishment of the relationship between study variable comprising of independent variables of digital Channels(Mobile Banking and Internet Banking) and the dependent variable is Supply chain risk(Data loss, System Downtown, Malware,) the study used the



regression model. The regression model was as follows  $S.C.R = B_0 + B_1(C) + B_2(RT) + (LT) + e$  where, S.C.R= Supply Chain Risk,  $B_0$ =Constant, C=Type of Channel, RT-Internet Banking, LT-Mobile Banking and  $e$  =Probable Error

## **CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

### **4.1 Introduction**

The chapter focuses on the analysis, presentation and interpretation of the data and discussions based on the objectives. It covers response rate, demographic information, Digitalization technology used in Commercial banks in Kenya, digitalization levels in Kenya Commercial Banks and effect of digitalization on Supply Chain Risk.

### **4.2 Instrument Return Rate**

Questionnaire return is the proportion of the questionnaires returned after they have been issued to the respondents. In this study questionnaires were administered to 44 staff of all the commercial banks in Kenya. All questionnaires sent out were returned completed, a 100% response rate. The reason the high response rate was due to the fact that the researcher administered them personally to the respondents, waited for them to fill and they were handed back to her.

**Table 4.1: Instrument Return Rate**

	<b>Frequency</b>	<b>Percentage</b>
Response	44	100
Non response	0	0
<b>Total</b>	<b>44</b>	<b>100</b>

**Source: Researcher data**

### **4.3 Demographic Information**

The demographic data of staff focused on their gender, age, and work department. Findings are presented in Table 4.2

**Table 4.2: Demographic Information**

	Category	Frequency	Percentage
<b>Gender</b>	Male	28	63.6
	Female	16	36.4
<b>Total</b>		<b>44</b>	<b>100.0</b>
<b>Age</b>	20-30 years	3	6.8
	31-40 years	25	56.8
	41-50 years	16	36.4
<b>Total</b>		<b>44</b>	<b>100.0</b>
<b>Department</b>	Management	10	22.7
	Procurement	14	31.8
	Information technology	20	45.5
<b>Total</b>		<b>44</b>	<b>100.0</b>

**Source: Researcher data**

Findings in Table 4.1 shows that; majority of the banks staff 63.6% were male, slightly more than half of the respondents 56.8% were aged between 31-40 years and majority of the banks staff 45.5% worked in Information Technology department. This implies that both gender was well represented in the study, the staff were old enough to understand the concept of the study having spent a number of years in the banking industry and having majority of the banks staff working under information technology, show that the information they gave helped to attain the research objectives.

#### **4.4 Digitalization Technology used in Commercial Banks in Kenya**

The first objective was to assess the digitalization technology used in commercial banks in Kenya. Respondents were asked to indicate the extent to which they make use of mobile phone application, internet banking and ATM cards. Responses are presented in Table 4.2.

**Table 4.3: Extent to which Digitalization Technology is used in Commercial Banks**

Extent to which digitalization technology is used in commercial banks	MPA		IB		ATM cards	
	F	%	F	%	F	%
Very large extent	44	100	43	97.1	37	56.7
Large extent	0	0	1	2.3	7	15.9
Moderate extent	0	0	0	0	0	0
Small extent	0	0	0	0	0	0
Very small extent	0	0	0	0	0	0
<b>Total</b>	<b>44</b>	<b>100</b>	<b>44</b>	<b>100</b>	<b>44</b>	<b>100</b>

**Source: Researcher data**

Findings in Table 4.3 show that all commercial banks in Kenya use mobile phone application to a very great extent, majority of the banks use internet banking to a very great extent as indicated by 97.7% of the staff and slightly more than half of Kenya commercial banks' use ATM cards to a very great extent as indicated by 56.7% of the staff. This implies that Commercial Banks in Kenya have embraced digitalization to a very great extent. This digital banking and digitalization has added to the existing products and services by offering new technology to improve convenient of customers. The finding is in agreement with Central Bank of Kenya (2016) report that mobile banking and Personal Finance Management are well received by consumers with download rates reaching over 40% of the customer base in most banks.

The researcher also sought to establish the online features regularly used by the commercial banks. Findings are presented in Table 4.4.

**Table 4.4: Online Features used Regularly by Commercial Banks**

<b>Online features</b>	<b>Frequency</b>	<b>Percentage</b>
Pay bills	44	100.0
Make an account inquiry	43	97.7
Transfer funds between accounts	43	97.7
Wire transfers	32	72.7
Process payroll	19	43.2
Order check books	10	22.7

**N=44**

**Source: Researcher data**

Findings in Table 4.4 show that; many customers of commercial banks in Kenya regularly use phone to pay bills, 97.7% of the banks' customers regularly use internet to make account inquiry, 97.7% use internet to regularly transfer funds between accounts, 72.7% make use of wire transfers, 43.2% use internet to process payroll and 22.7% of the commercial banks clients order check books online. This implies that commercial banks of Kenya regularly use online features which indicate that the banks have in the recent years shifted their processes from analogue to digital. The findings also show that banks have invested in mobile devices, phone and internet banking and harmonized internal data to push financial technology.

**4.5 Level of Digitalization in Commercial Banks in Kenya**

The second objective was to assess the level of digitalization in commercial banks in Kenya. Respondents were asked to indicate the extent to which their banks have adopted the listed digital platforms. Table 4.5. presents findings on mobile phone application in commercial banks.

**Table 4.5: Mobile Phone Application in Commercial Banks**

Features of Mobile phone application	1		2		3		4		5	
	%	F	%	F	%	F	%	F	%	F
The bank can manage customer complaints through mobile phone application	97.7	44	2.3	1	0	0	0	0	0	0
There is personalized banking by customers through their mobile phones e.g checking account balance	97.7	44	2.3	1	0	0	0	0	0	0
The bank ensures timely satisfaction of customer needs through personalized banking	95.5	42	4.5	2	0	0	0	0	0	0
The bank ensures timely communications to its customers through use of text message services	100.0	44	0	0	0	0	0	0	0	0

**N=44**

**Source: Researcher data**

Findings in Table 4.5 show that; 97.7% of the staff indicated that banks manages customer complaints through mobile phone application to a very large extent, 97.7% practice personalized banking to a very large extent, 95.5% ensures timely satisfaction of customer needs to a large extent and all banks ensures timely communications to its customers through SMS to a large extent. This shows that the banks have adopted digitalization through mobile phone application to a very great extent which has resulted to efficiency in operations and time saving since they do not have to physically visit the banks for various financial services.

Table 4.6 presents findings on the level of internet banking in commercial banks.

**Table 4.6: Internet Banking in Commercial Banks**

Uses of Internet banking	1		2		3		4		5	
	%	F	%	F	%	F	%	F	%	F
The bank provides an online platform for ordering cheque books, checking account balances	97.7	43	2.3	1	0	0	0	0	0	0
There is prompt responses to customer needs through online services	93.2	41	6.8	3	0	0	0	0	0	0
The bank has higher risk due to online banking	97.7	43	2.3	1	0	0	0	0	0	0
The bank has facilitated flexibility in its operations due to internet banking	93.2	41	6.8	3	0	0	0	0	0	0
The bank has facilitated availability of a wide variety of services due to internet banking	97.7	43	2.3	1	0	0	0	0	0	0

**N=44**

**Source: Researcher data**

Results in Table 4.6 show that 97.7% of the staff indicated that the banks provide an online platform for ordering cheque books and checking account balances to a very large extent, 93.2% indicated that the banks responds to customers' needs through online services to a very large extent, 97.7% indicated that the banks have higher risks due to online banking to a very large extent, 93.2% indicated that the banks have facilitated flexibility in their operations to a large extent and 97.7% of the staff indicated that the banks have facilitated availability of a wide of services to a large extent. This shows that the banks have embraced internet banking through establishment of Apps like M-banking which enables customers to transact from their accounts and also make enquiries online.

Table 4.7 presents findings on use of ATMs in commercial banks

**Table 4.7: Use of ATMs in Commercial Banks**

Uses of ATMS	1		2		3		4		5	
	%	F	%	F	%	F	%	F	%	F
The bank offers ATM services to its customers 24 hrs	95.5	42	4.5	2	0	0	0	0	0	0
Use of ATMs has facilitated increased risk to the bank	93.2	41	6.8	3	0	0	0	0	0	0
The bank has been able to offer flexibility to its customers through use of ATMs	95.5	42	4.5	2	0	0	0	0	0	0

**N=44**

**Source: Researcher data**

Findings in Table 4.7 show that 95.5% of the staffs indicated that their banks offer ATM services to their customers 24 hours to a very large extent, 93.2% of the staff indicated that use of ATMs have facilitated increases risk to the bank to a very large extent and 95.5% of the staff indicated that the banks have been able to offer flexibility to its customers through use of ATMs to a very large extent. This shows that the bank clients are offered either Credit cards, Debit cards or Atms cards which enable them to pay for goods and services with guaranteed security.

**4.6 Effect of Digitalization on Supply Chain Risk**

The third objective was to determine the effect of digitalization on Supply Chain Risk. The staff were asked to indicate the extent to which digitalization of Kenyan banks contribute to the listed supply chain risks. Findings on effect of mobile phone application on supply chain risk are presented in Table 4.8.



**Table 4.8: Effect of Mobile Phone Application on Supply Chain Risk**

Mobile phone application	1		2		3		4		5		Mean
	%	F	%	F	%	F	%	F	%	F	
Inability to get enquiries	100.0	44	0	0	0	0	0	0	0	0	1.00
Systems failure	100.0	44	0	0	0	0	0	0	0	0	1.00
Hacking	54.5	24	38.6	17	6.8	3	0	0	0	0	1.52
High costs	47.7	21	27.3	12	20.5	9	4.5	2	0	0	1.82
IT security breaches	90.9	40	9.1	4	0	0	0	0	0	0	1.09
Failures by suppliers	20.5	9	6.8	3	45.5	20	25.0	11	2.3	1	2.82
Transaction delays	93.2	41	4.5	2	2.3	1	0	0	0	0	1.11
Unplanned interruptions	97.7	43	2.3	1	0	0	0	0	0	0	1.05

**N=44**

**Source: Researcher data**

Results in Table 4.8 show that mobile phone application affect supply chain risk through inability to get enquiries on time, system failures leading to late deliveries of customers' needs, hacking by fraudsters, high costs incurred by customer use of digital services, IT security breaches, transaction delays and unplanned interruptions to a very large extent as indicated by a mean of between 1.02-1.82. Failure by suppliers also contributes to supply chain risks although to a large extent as indicated by a mean of 2.82. This shows that there is need to reduce disruptions caused by mobile phone application for the banks to achieve maximum benefits of digitalization. Durowoju, Chan, and Wang (2012) found out that the most uncertainties in the supply chain are the most unpredictable cost measure when a system failure breach occurs.

Findings on effect of Internet banking on supply chain risk are presented in Table 4.9.

**Table 4.9: Effect of Internet Banking on Supply Chain Risk**

Internet banking	1		2		3		4		5		Mean
	%	F	%	F	%	F	%	F	%	F	
Inability to get enquiries	97.7	43	2.3	1	0	0	0	0	0	0	1.02
Systems failure	84.1	37	9.1	4	6.8	3	0	0	0	0	1.23
Hacking	43.2	19	36.4	16	18.2	8	2.3	1	0	0	1.80
High costs	43.2	19	13.6	6	27.3	12	15.9	7	0	0	2.16
IT security breaches	97.7	43	2.3	1	0	0	0	0	0	0	1.02
Failures by suppliers	22.7	10	4.5	2	54.5	24	18.2	8	0	0	2.68
Transaction delays	90.0	40	2.3	1	4.5	2	2.3	1	0	0	1.39
Unplanned interruptions	90.0	40	4.5	2	4.5	2	0	0	0	0	1.14

**N=44**

**Source: Researcher data**

Results in table 4.9 show that internet banking affect supply chain risk through inability to get enquiries on time, system failures leading to late deliveries of customers' needs, hacking by fraudsters, hacking by fraudsters, IT security breaches, transaction delays and unplanned interruptions contribute to supply chain risks to a very large extent as indicated by a mean of between 1.02-1.80. Failure by suppliers and high costs incurred by customer use of internet banking also contributes to supply chain risks although to a large extent as indicated by a mean of 2.16 and 2.68 respectively. This implies that the dangers that internet banking is exposed to contribute to supply chain risk whereby the client are not able to get enquiries on time hence the need to take up measures aimed at protecting the bank online services and curbing cyber crime. Faisal et al. (2006) found out that information sharing on different supply chain risks could have an impact on the supply chain.

Findings on effect of ATMs on supply chain risk are presented in Table 4.10.

**Table 4.10: Effect of ATM on Supply Chain Risk**

ATMS	1		2		3		4		5		Mean
	%	F	%	F	%	F	%	F	%	F	
Inability to get enquiries	95.5	42	2.3	1	2.3	1	0	0	0	0	1.09
Systems failure	97.7	43	2.3	1	0	0	0	0	0	0	1.05
Hacking	18.2	8	22.7	10	34.1	15	25.0	11	0	0	2.66
High costs	47.7	21	9.1	4	34.1	15	9.1	4	0	0	2.05
IT security breaches	95.5	42	2.3	1	2.3	1	0	0	0	0	1.09
Failures by suppliers	13.6	6	4.5	2	47.7	21	34.1	15	0	0	3.02
Transaction delays	93.2	41	4.5	2	2.3	1	0	0	0	0	1.09
Unplanned interruptions	95.5	42	4.5	2	0	0	0	0	0	0	1.05

**N=44**

**Source: Researcher data**

Results in table 4.9 show that ATMs affect supply chain risk through; inability to get enquiries on time, system failures leading to late deliveries of customers' needs, IT security breaches, transaction delays and unplanned interruptions contribute to supply chain risks to a very large extent as indicated by a mean of between 1.05-1.09. Hacking by fraudsters and high costs incurred by customer use of digital services contribute to supply chain risks to a large extent as indicated by a mean of 2.66 and 2.05 respectively and failure by suppliers contribute to supply chain risks to a moderate extent as indicated by a mean of 3.02. This implies that although use of ATMs guarantees customer security while making payments, it also negatively affects supply chain risk especially when the system fails which cause transaction delays. Norrman and Jansson (2004) asserted that just-in-time deliveries and shorter product life cycles led to an increase in supply chain vulnerability.

To study the relationship between independent and dependent variables, linear regression coefficient was used to establish the relationship between digitalization and supply chain risks whereby if the p value was less than 0.5 the relationship was considered significant and if the p value was greater than 0.5 the relationship was considered not significant.

**Table 4.11: Relationship between Mobile Phone Application and Supply Chain Risks**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.852	.181		4.701	.000
Inability to get enquiries on time	-.008	.063	.028	.121	.004
Hacking by fraudsters	.083	.042	.347	1.972	.003

a. Dependent Variable: There is personalized banking by customers through their mobile phones

**Source: Researcher data**

The results in Table 4.11 indicate that mobile phone application had significant ( $p < 0.05$ ) effect on supply chain risk. This implies that inability to get enquiries on time through mobile as compared to physical enquiries and hacking by fraudsters have an effect on the organization which include a loss of productivity.

**Table 4.12: Relationship between Internet Banking and Supply Chain Risks**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.967	.201		-4.823	.000
Inability to get enquiries on time	1.110	.143	.656	7.759	.000
System failures leading to late deliveries of customer needs	.193	.045	.427	4.312	.000
IT security breaches	.688	.162	.407	4.260	.000
Unplanned it interruptions	.106	.050	.193	2.108	.002

a. Dependent Variable: There is prompt responses to customer needs through online services

**Source: Researcher data**

The results in Table 4.12 indicate that internet banking had significant ( $p < 0.05$ ) effect on supply chain risk whereby customers are not able to get enquires on time through internet banking, the system failure leads to late deliveries of customer needs, internet banking faces IT security breaches and internet banking experience unplanned interruptions. This shows that despite the fact that technology helps the organization to manage complex global supply chains, it also poses challenges to bank's managers.

**Table 4.13: Relationship between Use of ATMs and Supply Chain Risks**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.123	.538		.228	.821
Inability to get enquiries on time	-.248	.419	-.218	-.591	.558
System failures leading to late deliveries of customer needs	2.539	.832	1.424	3.050	.004
Hacking by fraudsters	-.077	.048	-.152	-1.595	.120
High costs incurred by customer use of digital services	-.036	.042	-.073	-.853	.400
IT security breaches	-.382	.313	-.336	-1.218	.231
Failures by suppliers	-.135	.055	-.244	-2.469	.019
Transaction delays	-.240	.162	-.162	-1.480	.148
Unplanned it interruptions	-.028	.326	-.011	-.087	.931

a. Dependent Variable: The bank offers ATM services to its customers 24 hrs

**Source Source: Researcher data**

The results in Table 4.13 indicate that use of ATMs had no significant ( $p > 0.05$ ) effect on supply chain risk although ATMs failure leads to late delivery of customer needs.

**4.7 Regression Analysis**

The third objective of this study was to find out the relationship between digitalization and the supply chain risk. In order to establish the relationship between Digitalization and

supply chain risk, a composite index of supply chain risk was regressed on the indices of digitalization.

#### 4.7.1 Model Summary

Table 4.14 below summarizes the results of the regression.

**Table 4.14: Regression Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.817 <sup>a</sup>	.667	.619	.25000

a. Predictors: (Constant), mobile application, internet application and ATMs

The multiple R for the regression is 0.817, suggesting that there is a strong, positive correlation between the values that the model predicts and the actual values of the dependent variable. The R Square is 0.667, and this means that about 66.7% of the variation in the commercial banks supply chain risks can be explained by the variation in the extent to which they have attained digitalization. The Multiple R and the R Square suggest that digitalization affects the supply chain risks.

#### 4.8 Analysis of Variance

To establish if the regression model is significant, the researcher used the F test of significance of a regression model. Table 4.15 below shows the result of the F test of a regression model.

**Table 4.15: Analysis of Variance-Mobile Phone Application**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.384	8	.048	2.833	.004 <sup>b</sup>
	Residual	.593	35	.017		
	Total	.977	43			

a. Dependent Variable: The bank can manage customer complaints through mobile phone application

b. Predictors: (Constant), Unplanned it interruptions, Transaction delays, System failures leading to late deliveries of customer needs, High costs incurred by customer use of digital services, Failures by suppliers, Hacking by fraudsters, IT security breaches, Inability to get enquiries on time

**Table 4.16: Analysis of Variance-Internet Application**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.223	8	.278	16.972	.000 <sup>b</sup>
	Residual	.573	35	.016		
	Total	2.795	43			

a. Dependent Variable: There is prompt responses to customer needs through online services

b. Predictors: (Constant), Unplanned it interruptions, Transaction delays, Hacking by fraudsters, Failures by suppliers, High costs incurred by customer use of digital services, Inability to get enquiries on time, IT security breaches, System failures leading to late deliveries of customer needs

**Table 4.17: Analysis of Variance-ATMs**

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	9.464	8	1.183	13.954	.000 <sup>b</sup>
	Residual	2.967	35	.085		
	Total	12.432	43			

a. Dependent Variable: The bank offers ATM services to its customers 24 hrs

b. Predictors: (Constant), Unplanned it interruptions, System failures leading to late deliveries of customer needs, High costs incurred by customer use of digital services, Hacking by fraudsters, Failures by suppliers, Transaction delays, IT security breaches, Inability to get enquiries on time

**Table 4.18: Analysis of Variance-Effects of Digitalization on Supply Chain Risks**

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	2.321	24	.097	3.871	.002 <sup>b</sup>
	Residual	.475	19	.025		
	Total	2.795	43			

a. Dependent Variable: There is prompt responses to customer needs through online services

b. Predictors: (Constant), Unplanned it interruptions, High costs incurred by customer use of digital services, Transaction delays, Failures by suppliers, High costs incurred by customer use of digital services, Hacking by fraudsters, System failures leading to late deliveries of customer needs, Unplanned it interruptions, Hacking by fraudsters, IT security breaches, Failures by suppliers, Hacking by fraudsters, Transaction delays, High costs incurred by customer use of digital services, Inability to get enquiries on time, Inability to get enquiries on time.



#### 4.8 Regression of Coefficients

After establishing the significance of the regression model, the next step was to examine the coefficients of the regression model. Table 4.19 below shows the coefficients of the regression model.

**Table 4.19: Regression of Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.7314	0.4833		1.5133	0.000
Mobile Phone App	0.4206	0.2817	0.162	1.4931	0.000
Internet Banking	0.8301	0.5312	0.462	1.0187	0.000
ATMs	0.5271	0.4643	0.324	1.2491	0.000

a. Dependent Variable: Supply Chain Risks

The regression coefficients were tested for significance at the 0.05 significance level. From the findings in table 4.14, the significance values of the test statistics used to evaluate the significance of the regression coefficients all fall below 0.05, indicating that the coefficients are significant predictors of the dependent variable. Therefore, the regression model is a good representation of the relationship hypothesized in this study.

# **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

## **5.1 Introduction**

This chapter focuses on the summary of the major findings and conclusions. It also suggests recommendations for potential actions and suggestions for future research.

## **5.2 Summary of Findings**

The purpose was to assess digitalization and supply chain risk among commercial banks in Kenya. The study was guided by the following research questions: What are various digitalization Technology used by Commercial banks in Kenya? What are the risks the technology brings to the banks? Lastly, what are the effects of digitalization on Supply Chain Risk? Data was presented in relation to the study findings; male members of staff are taking a high population as compared to female staff in Kenya commercial banks. Majority of the staff were aged between 31-40 years and they worked in Information Technology department. The findings in each objective are summarized in the subsequent sections:

### **5.2.1 Digitalization Technology used in Commercial Banks in Kenya**

In line with objective one: findings established that all commercial banks in Kenya use mobile phone application, majority of the banks use internet banking as indicated by 97.7% and more than half of Kenya commercial banks' use ATM cards as indicated by 56.7% of the staff whereby the banks frequently use phone to pay bills as indicated by all staff members, use internet to make account inquiry as indicated by 97.7%, use internet to regularly transfer funds between accounts as indicated by 9.7%, make use of wire transfers as indicated by 72.7% , use internet to process payroll as indicated by 43.2% and the

commercial banks clients ordered check books online as indicated by 22.7% of the staff. The finding concurs with Economic banking report (2015) that new ways to pay through contactless payments for credit and debit cards which involve use of smart phones and other mobile devices that use radio frequency identification and near field communication helps clients during transaction processing. Most of the Commercial Banks in Kenya are digitalized and use digital channels to serve their clients.

### **5.2.2 Level of Digitalization in Commercial Banks in Kenya**

In line with objective two: the study established that through mobile phone application, the bank manages customer complaints as indicated by 97.7%, the banks customers practice personalized banking as indicated by another 97.7%, banks ensures timely satisfaction of customer needs as indicated by 95.5% and the bank also ensures timely communications to its customers through SMS as indicated by all respondents. findings also established that through internet banking, the banks have been able to provide an online platform for ordering cheque books as indicated by 97.7%, prompt responses to customer needs through online services as indicated by 93.3% and the bank has facilitated availability of a wide variety of services due to internet banking as indicated by 97.7% of the staff members. This shows that banking in Kenya have really changed in the recent times compared to how it used to be some years back.

The finding concurs with Scott & Arias (2011) that the banking sector in Kenya has experienced weighty changes mostly due to technological innovations and the unstoppable forces of globalization which have continued to create expansion opportunities as well as challenges to bank's managers to ensure their bank remain profitable and competitive.

### **5.2.3 Effect of digitalization on Supply Chain Risk**

In line with objective three: findings established that digitalization in banks through use of mobile phones, internet banking and ATMs contribute to supply chains risks to a very large extent as indicated by all respondents 100% whereby digitalization contributes to inability to get enquiries on time, system failures (breakage/down time) leads to late deliveries of customers' needs, digitalization faces a challenge of hacking by fraudsters, the banks incurs high costs in providing digital services, digitalization is threatened by IT security breaches, some technology supplies fail to deliver and unplanned technology interruptions causes losses to organizations.

This implies that supply chains risks have an effect on the organization which include a loss of productivity. This finding concurs with Wagner and Neshat (2010) that chain managers could reduce the number of disruptions and their impact if they were more capable of assessing and dealing with supply chain vulnerability

### **5.3 Conclusion**

It was concluded that Kenya commercial banks have invested in mobile devices, phone and internet banking and use of ATMs and harmonized internal data to push financial technology. The banks clients online features that are facilitated by the banks to pay bills, make account inquiry, transfer funds between accounts and order check books while the bank use online features to transact wire transfers, process payroll. The use of ATMs, credit and debit cards help clients during transaction processes.

The study also established that that banking in Kenya have really changed in the recent times compared to how it used to be some years back hence helping the organization to manage supply chains in order to minimize the risks. Kenya commercial banks have

experienced substantial modifications as a result of technological innovation like facilitation of personalized banking, providing an online platform for ordering cheque books, checking account service and offering ATMs services to their customers 24 hours. There digitalization saves time for banks clients as they do not have to physically visit the banks for service delivery.

It was also concluded that despite the fact that digitalization have positive effects to the banks and their clients, it also negatively affect supply chain risk through systems failure, hacking by fraudsters, IT security breaches unplanned interruption. Supply chains risks have an effect on the organization which include a loss of productivity; an increase in customer complaints; damaged brand and rising costs of business. Therefore banks should take supply chain risk management as a key function of the organization.

#### **5.4 Recommendations**

The listed recommendations were made in order to enhance digitalization as well as reduce supply chain risk among Kenya Commercial banks. The banks management should embrace and support a risk management system that will help having supply chain business continuity that enables good practices that create resilience. They should consider to include political and civil unrest, laws and regulations, terrorism, natural disasters and technology. The banks should aim at training their customers on technology use that they can embrace it and be able to utilize digitalized services like mobile banking, making enquiries online and using ATMs. This will help save time and costs for both the bank and their customers.

The bank management should set funds to purchase back up systems for continuity of digitalized services even during power interruptions and also hire IT experts to ensure that their online security is not breached and no hacking incidents.

### **5.5. Suggestions for further study**

The researcher suggests listed areas for further study. These include a related study incorporating micro finance banks could be carried out to determine if the effects of digitalization on supply chain risk apply to other banks. A replica of the study should be carried out incorporating more variables that possibly influence digitalization of Commercial banks.

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# APPENDICES

## Appendix I: Questionnaire

This questionnaire is a meant to collect data regarding the digitalization and supply chain risk among commercial banks in Kenya

All of the answers you provide in this survey will be kept confidential. The survey data will be reported in a summary fashion only and will not identify any individual person.

This survey will not take more than 20 minutes to complete.

### SECTION A: GENERAL PERTICULARS

#### 1. Bank Particulars

Name of the Bank (Optional) .....

#### 2. Respondent Particulars

##### DEPARTMENT

NO	Department	Tick appropriate
1	Management	
2	Procurement	
3	Information technology	

3. GENDER            Male: [   ]            Female [   ]

4. AGE                20-30 [   ]            31-40 [   ]            41-50 [   ]            51-60 [   ]

5 .Please indicate the extent you make use of the following channels in your bank  
Use the scale of 1-5 and tick on the appropriate column

1. To a very large extent
2. Large extent
3. Moderate extent
4. Small extent
5. Very small extent

- A. Mobile phone application
- B. Internet Banking
- C. ATM cards

3. Which online features do you use regularly? Please select all that apply.

- Pay bills
- Make an account inquiry
- Transfer funds between accounts
- Wire Transfers
- Process payroll
- Order check books
- Other

**SECTION B**

**DIGITALIZATION IN BANKS**

**To what extent has your company adopted the following digital platforms in your firm?**

Use the scale of 1-5 and tick on the appropriate column

- 1. To a very large extent
- 2. Large extent
- 3. Moderate extent
- 4. Small extent
- 5. Very small extent

NO	DIGITALIZATION CHANNELS	1	2	3	4	5
1	<b>Mobile phone application</b>					
	The bank can manage customer complaints through mobile phone application					
	There is personalized banking by customers through their mobile phones e.g checking account balance					
	The bank ensures timely satisfaction of customer needs through personalized banking					
	The bank ensures timely communications to its customers through use of text message services					
2	<b>Internet banking</b>					
	The bank provides an online platform for ordering cheque books, checking account balances					
	There is prompt responses to customer needs through online services					

	The bank has higher risk due to online banking					
	The bank has facilitated flexibility in its operations due to internet banking					
	The bank has facilitated availability of a wide variety of services due to internet banking					
<b>3</b>	<b>ATMS</b>					
	The bank offers ATM services to its customers 24 hrs					
	Use of ATMs has facilitated increased risk to the bank					
	The bank has been able to offer flexibility to its customers through use of ATMs					

### SECTION C

#### Assessment of impact of digitalization on supply chain risk

**To what extent does digitalization of Kenyan banks contribute to the following supply chain risks?**

Use the scale of 1-5 and tick on the appropriate column

1. To a very large extent
2. Large extent
3. Moderate extent
4. Small extent
5. Very small extent

<b>DIGITALIZATION IN BANKS</b>	<b>SUPPLY CHAIN RISK</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Mobile phone application</b>	Inability to get enquiries on time					
	System failures leading to late deliveries of customer needs					
	Hacking by fraudsters					
	High costs incurred by customer use of digital services					
	IT security breaches					
	Failures by suppliers					
	Transaction delays					
	Unplanned it interruptions					

<b>Internet banking</b>	Inability to get enquiries on time					
	System failures leading to late deliveries of customer needs,					
	Hacking by fraudsters					
	High costs incurred by customer use of digital services					
	IT security breaches					
	Failures by suppliers					
	Transaction delays					
	Unplanned it interruptions					
<b>Use of ATMS</b>	Inability to get enquiries on time					
	System failures leading to late deliveries of customer needs					
	Hacking by fraudsters					
	High costs incurred by customer use of digital services					
	IT security breaches					
	Failures by suppliers					
	Transaction delays					
	Unplanned it interruptions					

*Thank you for agreeing to take this survey*

## **Appendix II: List of Commercial Banks in Kenya**

- |   |                                 |
|---|---------------------------------|
| 1 Victoria Commercial Bank Ltd.         | 24. Family Bank Limited.        |
| 2 UBA Kenya Bank Limited.               | 25 Family Bank Limited.         |
| 3 Trans-National Bank Ltd.<br>Ltd.      | 26 Equatorial Commercial Bank   |
| 4 Standard Chartered Bank Kenya Ltd.    | 27. Ecobank Kenya Ltd.          |
| 5 Prime Bank Ltd.                       | 28 Dubai Bank Kenya Ltd.        |
| 6 Paramount Universal Bank Ltd.<br>Ltd. | 29. Diamond Trust Bank Kenya    |
| 7 Oriental Commercial Bank Ltd.<br>Ltd. | 30. Development Bank of Kenya   |
| 8 NIC Bank Ltd.                         | 31. Credit Bank Ltd.            |
| 9 National Bank of Kenya Ltd.<br>Ltd.   | 32. Co-operative Bank of Kenya  |
| 10 Middle East Bank (K) Ltd.<br>Ltd.    | 33. Consolidated Bank of Kenya  |
| 11 K-Rep Bank Ltd.<br>Ltd               | 34. Commercial Bank of Africa   |
| 12 Kenya Commercial Bank Ltd.           | 35. Citibank N.A Kenya.         |
| 13 Jamii Bora Bank Limited.             | 36. Chase Bank (K) Ltd          |
| 14 Imperial Bank Ltd.                   | 37. Charterhouse Bank Ltd       |
| 15 I & M Bank Ltd.                      | 38. CFC Stanbic Bank Ltd.       |
| 16 Habib Bank Ltd.                      | 39. Barclays Bank of Kenya Ltd. |
| 17 Habib Bank A.G Zurich.               | 40. Bank of India.              |
| 18 Gulf African Bank Limited.           | 41. Bank of Baroda (K) Ltd.     |
| 19 Guardian Bank Ltd.                   | 42. Bank of Africa Kenya Ltd    |
| 20 Giro Commercial Bank Ltd.<br>Ltd     | 43. African Banking Corporation |
| 21 First community Bank Limited.        | 44 Fina Bank Ltd.               |
| 22 Fidelity Commercial Bank             |                                 |