CHALLENGES IN THE IMPLEMENTATION OF MOBILE BANKING INFORMATION SYSTEMS IN COMMERCIAL BANKS IN KENYA

BY

BOAZ JUMA OTIENO

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DECLARATION

This management research project is my original work and to the best of my knowledge, it has not been submitted for a degree in any other university

Signed ..... Date 19/11/08

Boaz Juma Otieno

D61/P/8391/2005

This research proposal has been submitted for examination with my approvals as the university supervisor

Signed ..... Date 19/11/08

Mrs. Kate Litondo

Lecturer

School of Business

University of Nairobi

DEDICATION

This research project is dedicated to Yvonne Akinyi my youngest beloved sister: through you we can see our mother still alive.

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I would like to thank the almighty GOD through whose grace I have studied and completed this course.

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ABSTRACT

Many banks and financial institutions are interested in acquiring new technologies that enhance competitive advantage. However new technologies come with its challenges, the major challenge for information systems such as mobile banking information systems is their successful implementation. If not properly implemented many ICT systems will fail to deliver the business benefits expected from such systems. This study was conducted with a view of finding how such challenges can be identified and overcome.

This research was conducted by collecting data from commercial banks ICT managers , the managers filled a hand delivered questionnaire which tried to identify some of challenges of mobile banking information systems. Part A was concerned with getting demographic data about the respondents whereas part B of the questionnaire was aimed at identifying the challenges in the implementation of mobile banking information systems. A total response rate of 72% was recorded. The data was analyzed using proportions, ratios, means and standard deviation to identify the relative importance of various factors which makes it difficult to implement mobile information systems

The successful implementation of mobile banking is crucial for provision of mobile banking services. A number of factors pose challenge to the implementation, these factors include security, legislative and user related challenges. In security there is a strong feeling that mobile banking systems are not secure and reliable. The legislation that govern use and operation of mobile banking systems is still not clearly defined and that banks are not regulated on they way they can offer such services. Users have not been keen on adopting mobile banking services this might because of security fears and the fact that they are still accustomed to the normal banking systems. However the study also overall noted that the following factors do not pose a challenge to the implementation of mobile banking information systems; these are managers, employees, finances, and technology.

Managers in general need to be aware of challenges in implementing information systems, they should devise ways to minimize and reduce the possibility of such challenges occurring and they should come up with ways to overcome these challenges to ensure a successful implementation.

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LIST OF ABBREVIATIONS

ATM - Automated Teller Machines

CIO - Chief Information Officer

DFID - Department for International Development

FDCF - Financial Deepening Challenge Fund

GSM - Global System for Mobile Communication

HTML - Hypertext Markup Protocol

ICT - Information Communication and Technology

M-Banking – Mobile banking

M-Commerce – Mobile Commerce

PDA - Personal Digital Assistants

PIN – Personal Identification Number

SIM- Subscriber Identification Module

SMS - Short Message Service

UMTS - Universal Mobile Telecommunications System

WAP - Wireless Application Protocol

WML - Wireless Application Protocol

XML -Extensible Markup Language

2G – Second Generation mobile networks

3G – Third Generation mobile networks

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Information communication and technology ICT has transformed many organizations bringing with it efficiency and improved productivity. Capron (2004). The banking sector has embraced changes occurring in ICT with most banks having already achieved branchless banking as a result. According to central bank of Kenya annual bank supervision report (2006), the increased utilization of modern ICT has for example led to several banks acquiring automated teller machines, ATMs as part of their branchless development strategy measures. The central bank denotes that the advancement in ICT in the banking industry has enhanced efficiency and improved customer service. Several banks have also started offering e-banking services that includes internet banking, short message service (SMS banking) and mobile banking. The trend in mobile banking is however still at infancy in terms of level of utilization expected in this sector, (Central bank annual report, 2006).

1.1.1 The concept of mobile banking

Laudon and Laudon (2005) defines Mobile banking (M-banking) as the provision of banking services using handheld devices such as mobile phones, palmtop computers and personal digital assistants. Tiwari and Buse, (2007), define mobile banking as the provision and availment of banking and financial services with the help of mobile telecommunication devices. It is worth noting that in this case we are not talking about mobile banking services that are provided by vehicles that move from one area to another offering banking services but mobile banking services provided through use of mobile phones, personal digital assistants and palmtop computers.

The co-op bank (See http://www.co-opbank.co.ke/epayments.php?cat=6&sub=72 06/04/08) indicates the implementation of a variety of M-banking services that include: a) payments of bills ; b)checking bank statements ; c) checking account balances ; d) transferring funds from one account to another ; e) checking whether cheques have been cleared ; f) checking status of transactions ; g) checking credit card information ; h) account maintenance and administration ; i) PIN alteration ; j) topping up mobile credit amongst others.

As at 2007 there were over 8 million Kenyans (Safaricom report 2007) who own mobile phone and other hand held devices such as personal digital assistant (PDAs) and palm top computers. These are potential clients for M-banking system.

1.1.2 System implementation and mobile banking

According to Yeates (2001), implementation of systems involves a collection of activities that are aimed operationalizing a new system in an organization. This involves a number of activities that include; (a) Seeking approval from management to implement the new system; (b) Acquiring and setting in place the required hardware and software system; (c) Testing the system; (d) File conversion and database preparation; (e) Using the agents of change; (f) Selecting and training the users ; (g) Launching the new system

O'Brien (1993) describes implementation as doing what you planned to do. Therefore implementation is an important activity in the deployment of ICT systems to support an organization and its end users. O'Brien summarizes implementation activities as involving acquisition of hardware and software and services, software development or modification, end user training, system documentation and conversion.

The successfully implementation of new ICT systems bring the benefits of cost saving, better information handling and timely and accurate information for improved decision making, besides it provide a competitive edge. However if not properly implemented ICT systems can result in huge losses for the organization in terms of lost business opportunity, poor management and handling of information and hence poor decision making, (Burch and Felix, 2002). Therefore successful implementation of mobile banking services is expected to bring cost savings to financial institutions and provide a competitive edge (Mennecke, 2003).

1.1.3 Challenges in the Implementing of Mobile Banking Systems

M-banking implementation faces a myriad of challenges some technological, others social and even cultural. The increased uptake and use of these services will only be guaranteed if the banks address the real implementation challenges facing these systems. Cadle and Yeates (2001) outline the major challenges of M-banking as including: (a) Lack of management support – without the support and full involvement management the implementation of M-banking system

cannot be a reality since management are the key to various organization resources and decisions ; (b) Lack of user involvement – users should be involved to ensure the new system is usable and widely acceptable to everyone and also to ensure that the final new system meet their requirements and expectations ;

(c) Resistance to change – introducing a new system bring about anxiety and uncertainty that may cause the system to be rejected, users and managers may resist a new system for personal reasons such as fear of job loss and loss of authority and power as the new system is implemented ; (d) Lack of change management program – an effective change management program will prepare both the users and even the customers for the launch of a new system if change is not managed properly people are likely to reject them; (e) Skills and Technological challenges – the implementation of the new system requires new skills and this may not easily and readily available, the effort to train new employees may be a time consuming and costly affair ;

(f) Communication barriers – These occurs where the channels of communication followed are not up to task, the right information does not flow to the all the stakeholders to assist them make informed decisions and therefore rumours and grapevine become the only source of information leading to poor decisions ; (g) Lack of proper risk management – any new system has its inherent risks that have to be seriously considered and corrective actions taken otherwise the system will fail, for any risk identified necessary corrective and minimization actions should be taken to reduce the impact and the possibility of the risk occurring ; (h) Security problems – these is where people access the system without authority and perform illegal activities such as fraud and sabotage any newly developed system especially a financial system with in adequate security controls is likely to fail ; (i) Regulatory challenges – industry and government regulations can affect considerably the implementation of new system. Besides legal hurdles can be subtle barriers to the successful development of any system.

Tiwari and Buse (2007) outline the challenges of implementing mobile banking as including

(a) Interoperability - There is a lack of common technology standards for mobile banking. Many protocols that are being used for mobile banking – Hypertext Markup Protocol HTML, Wireless Application Protocol WAP, Extensible mark up language XML are not compatible with each other and cannot easily exchange data. :

(b) Security - Security of financial transaction, being executed from some remote location and transmission of financial information over the air, are the most complicated challenges that need to be addressed jointly by mobile application developers, wireless network service providers and the bank's ICT departments; (c) Scalability & Reliability -Another challenge for the Chief Information Officers of the banks is to scale-up the mobile banking infrastructure to handle exponential growth of the customer base.

With mobile banking, the customer may be sitting in any part of the world (a true anytime, anywhere banking) and hence banks need to ensure that the systems are up and running in a true round the clock fashion; (d) Application distribution - Due to the nature of the connectivity between bank and its customers, it would be impractical to expect customers to regularly visit banks or connect to a web site for regular upgrade of their mobile banking application. It will be expected that the mobile application itself check the upgrades and updates and download necessary patches; (e) Personalization - It would be expected from the mobile application to support personalization such as: Preferred Language, Date / Time format, Amount format, Default transactions, Standard Beneficiary list and Alerts e.t.c. These vary from individual to another and from one country to another creating a challenge.

Department for International Development (DFID) report (2006) indicates that most African providers of M-payments and M-banking services reported that the major barriers to their growth related to uncertainties over customer adoption, which is common at an early phase of market development; and, specific regulatory issues such as remote customer due diligence requirements and access to the payments system.

1.1.4 The banking sector in Kenya

Kenya has a total of 43 commercial bank with equity bank having the largest customer base of around 2 million account holders (see equity bank website 07/04/08). For a listing of all commercial banks in Kenya see appendix I. Latest advertisement in the daily nation 08/04/08 show a major shift in services offered by commercial banks most are now offering mobile banking M-banking and mobile brokering M-brokerage services which were mostly a preserve of investment banks such a FAIDA investment bank.

The central bank report (2006) indicates that most banks are embracing new ICT services in their effort to remain competitive and also attract new customers. This adoption of new ICT technologies is very visible from the increased use of ATMs and increased provision of e-banking systems such as internet banking, SMS banking and mobile banking.
The trend in mobile banking is however still at infancy in terms of level of utilization expected in this sector (Central bank of Kenya report, 2006).

Mobile banking information system is a relative new technology which is being adopted at a high rate. Many organizations especially financial institutions are finding it a challenge to successfully use and adopt mobile banking information systems. It is also clear that managers face a lot challenges when trying to new implement systems in the organization, it is only when the managers can successfully identify the challenges to implementation of mobile banking information system that can they ensure its smooth and successfully implementation. This study focuses on identifying challenges of mobile banking information system and the extent to which they are an impediment to a successful implementation.

1.2 PROBLEM STATEMENT

As cited different, authors have come up with different challenges to mobile banking. In Kenya mobile network operators keen to having a share of the lucrative M-banking market are also posing a challenge. Operators such as Safaricom (M-PESA) and Zain (Soko Tele) have spent billions of pounds on third-generation mobile phone licenses are now desperate to find ways of recouping their money and some experts expect many operators to apply for banking licenses in the future. As the trend is shifting to mobile banking, there is a challenge for Chief Information Officers of banks to decide on how to leverage their investment in internet banking and offer mobile banking, in the shortest possible time (Tiwari and Buse, 2007).
With changing nature and capability of the mobile handset and devices, and also with the changing preferences and needs for mobile service by mobile customers. Many mobile service providers as well as financial institutions are challenged to successfully implement and provide sustainable mobile banking information system which are not only flexible and adaptable but also compatible with others system within and outside the organization (Tiwari and Buse, 2007).

Financial institutions have had difficulty providing services through traditional channels to poor clients, particularly since branches are so expensive to maintain. On the other hand, mobile phone providers have identified M-banking/M-payments systems as a potential service to offer customers, increasing loyalty while generating fees and text-message charges (infoDEV, 2006). A meeting between banks, mobile carriers, technology firms, regulatory agencies, donors, hardware and software providers, and, of course, users themselves is needed, to determine the shape of m-banking/m-payments services in the developing world (infoDEV, 2006; Ivatury, 2004; Ivatury & Pickens, 2006; Porteous, 2006).

Given the many and recent developments in banking services and the fact that studies that have so far been done on ICT and the banking sector have not looked at implementation of M-banking systems; this paper is aims at filling this knowledge gap. Many papers have been done on e-commerce and internet for example Nyaanga (2007) looked at the effects of E-Commerce adoption on business process management in commercial banks in Kenya. While Otieno (2006) looked at an investigation into internet banking technology adoption among Kenyan commercial banks, it is worth noting that the focus in this survey was in internet banking and not mobile banking. Mulei (2007) looked at a survey of internet banking systems adoption by institutional customers in Kenya. Otunya, (2006) did a survey on consumer adoption of mobile phone banking in Kenya.

This study therefore seeks to answer the following research question:-
What challenges do commercial banks in Kenya encounter in the implementation mobile banking information systems?

1.3 OBJECTIVE OF THE STUDY

The objective of the study was:-
To determine the challenges in the implementation of mobile banking information systems in commercial bank in Kenya.

1.4 IMPORTANCE OF STUDY

The results of this study will be of great importance to both the banking sector and their consumers. For consumers they will have the privilege of enjoying the banking services remotely and wherever they are and they will be able to conduct M-banking services without fear or worry. They will access bank services and do transactions at the comfort of their homes and hotels. M-banking has also been hailed by the DFID as one of the ways to greatly reduce poverty in developing countries. Moreover M- banking services are expected to be cheaper than normal banking services.

For banks they will be able to provide new competitive services that result in reduced agency costs and develop more and diverse customers' base. Besides banks will be able to attract and reach customers country wide without having to set up branches in such areas. If extended to include businesses then this service has a high potential to greatly change the traditional business systems of billing and paying. It can result in secure and fast payment systems that enhance trade and facilitate faster development of a nation.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Mobile banking technology if properly implemented will open up financial services to the non-banked and besides it will play a greater role in the alleviation poverty, DFID report (2006). For banks it the technology will bring with it cheaper transaction costs and competitive advantage and an increase in the clientele base (Mennecke, 2003).

2.2 Mobile Commerce

Today various mobile commerce (m-commerce) applications are increasing enterprise ability to offer mobile services that are easily accessible anywhere anytime. m-commerce are applications are generally used to fulfill some task that are not suitable for web enabled e-commerce services such as mobile inventory and tracking mobile payment systems and mobile ticketing. The crucial challenge or success factor to modern organization is whether they are able to provide enough useful application that customers can access and are willing to use. Nansi (2004).

Laudon and Laudon (2005) state that the use of handheld wireless devices for purchasing goods and services from any location is Mobile commerce. Although mobile commerce represents a small fraction of total e-commerce, transaction revenue has been steadily growing. In 2005 there were an estimated 155 million cell phone users in the US and over 1.6 billion wireless and mobile devices world wide. M-commerce services can be classified into a number of applications as shown in Table 1.

Table 1: M-commerce services and applications

M-commerce service	Applications
Information based service	Instant messaging, e-mail, searching for movie restaurants using cell phone or PDA
Transaction based service	Purchasing stock, concert tickets music or games ; searching for the best price of an item using a cell phone
Personalized service	Services that anticipates what a customer wants based on the person's location or data profile such as updated airline flight information or beaming coupons for nearby restaurants

Tiwari and Buse (2007) indicate that Mobile Commerce has gained increasing acceptance amongst various sections of the society in previous years. The reasons for its growth can be traced back to technological and demographical developments that have influenced many aspects of the socio-cultural behaviour in today's world. The need for mobility seems to be the driving force behind Mobile Commerce. The launch of Universal Mobile Telecommunications System (UMTS) technology has provided Mobile Commerce with the necessary nerve.

Laudon and Laudon (2005) pinpoint some challenges of M-commerce challenges as including:
a) Keyboards and screens on cell phones are still tiny and awkward to use; b) the data transfer speeds on 2nd generation 2G cellular network are very slow compared to dial up and high aped internet connections for PCs; c) each second waiting for data to download costs the customer money.
d) Most internet enabled phones have limited memory and power supplies most content for wireless devices is in the form of test with very little graphics.

2.3 Mobile Banking

Laudon and Laudon (2005) defines Mobile banking (M-banking) as the provision of banking services using handheld devices such as mobile phones, palmtop computers and personal digital assistants. The co-op bank (See http://www.co-opbank.co.ke/epayments.php?cat=6&sub=72 06/04/08) indicates the implementation of a variety of M-banking services that include: a) payments of bills ; b)checking bank statements ; c) checking account balances ; d) transferring funds from one account to another ; e) checking whether cheques have been cleared ; f) checking status of transactions ; g) checking credit card information ; h) account maintenance and administration ; i) PIN alteration ; j) topping up mobile credit .

In one academic model Tiwari and Buse, (2007), mobile banking is defined as: The provision and availment of banking and financial services with the help of mobile telecommunication devices

Tiwari and Buse (2007) through their online university web site(See http://hup.sub.uni-hamburg.de/purl/HamburgUP_Tiwari_Commerce_05/_03/08) indicates that Mobile Banking presents an opportunity for banks to retain their existing, technology-savvy customer base by

offering value-added, innovative services and to attract new customers from corresponding sections of the society. Many banks have come to regard Mobile Banking as a necessary tool for thwarting negative differentiation vis-à-vis rivals and to foster/retain an innovative image.
This self-reinforcing dynamism is expected to gain currency in near-future so that Mobile Banking services could soon advance to a standard product – on the lines of Online Banking offered by more or less each and every bank.

Finally Donner (2007) define the terms M-banking, M-payments and M-finance collectively to a set of m-commerce applications which enable people to use their mobile telephones to manipulate their bank accounts, store value on an account linked to their handset, transfer funds to people or merchants, or even access loans or insurance products.

Mobile banking brings with it many advantages both to the consumer and to the financial institution offering the services. Customers are not restricted by time or by location, busy customers can check account balance as they move on the street and make payments or transfer funds while riding in elevators. Customers can still access mobile banking services remotely and even without a bank account they can be able to access mobile banking services (May, 2001). Mennecke (2003) indicates that mobile banking does not require banks to set up full branches to offer services, also banks can provide mobile banking services at a reduced rate from services offered in braches. Besides banks can reach more customers and expand their market easily and faster using mobile banking than with branches. Finally banks can benefit from secure transactions provided by mobile banking devices such as phones and personal digital assistants PDAs (Rhoton, 2001).

Mobile banking implementation involves a number of activities, first ensuring that all the hardware and software systems required are in place. The telecommunications network needed to establish links with mobile devices such as cell phones, palmtop computers and PDAs should also be installed and fully tested to ensure it works reliably and securely (May, 2001). Mobile banking services can be provided in a number of ways using web based applications; using short message service; using voice based communication systems (Ajc, 2007).

Becker (2007) indicates that the right software for implementation of mobile banking needs to be installed on the devices used for wireless communications such as cell phone, palmtop computers and personal digital assistants. Users can choose from a variety of technology that includes, wireless mark up language, WML wireless application protocol, WAP and I-mode. Each of these software standards offers a variety of advantages to user of the technologies.

2.3.1 Trends in Mobile Banking

Tiwari and Buse (2007) indicate that the advent of the Internet has revolutionized the way the financial services industry conducts business, empowering organizations with new business models and new ways to offer round the clock accessibility to their customers. The ability to offer financial transactions online has also created new players in the financial services industry, such as online banks, online brokers and wealth managers who offer personalized services, although such players still account for a tiny percentage of the industry. Over the last few years, the mobile and wireless market has been one of the fastest growing markets in the world and it is still growing at a rapid pace. According to the Global System for Mobile Communication GSM Association and Ovum, the number of mobile subscribers exceeded 2 billion in September 2005, and now exceeds 2.5 billion (of which more than 2 billion are GSM).

According to a study by financial consultancy Celent, 35% of online banking households will be using mobile banking by 2010, up from less than 1% today. Upwards of 70% of bank center call volume is projected to come from mobile phones. Mobile banking will eventually allow users to make payments at the physical point of sale. Mobile contact less payments will make up 10% of the contact less market by 2010. Many believe that mobile users have just started to fully utilize the data capabilities in their mobile phones. In Asian countries like India, China, Indonesia and Philippines, where mobile infrastructure is comparatively better than the fixed-line infrastructure, and in European countries, where mobile phone penetration is very high (at least 80% of consumers use a mobile phone), mobile banking is likely to appeal even more. This opens up huge markets for financial institutions interested in offering value added services.

With mobile technology, banks can offer a wide range of services to their customers such as doing funds transfer while traveling, receiving online updates of stock price or even performing stock trading while being stuck in traffic. In the last 4 years, banks across the globe have invested billions of shillings to build sophisticated internet banking capabilities.

As the trend is shifting to mobile banking, there is a challenge for Chief Information Officers of these banks to decide on how to leverage their investment in internet banking and offer mobile banking, in the shortest possible time. The proliferation of the 3G (third generation of wireless) and widespread implementation expected for 2003-2008 will generate the development of more sophisticated services such as multimedia and links to m-commerce services.

2.3.2 Mobile Banking Services

Ajc (2007) states that commercial banks can use a variety of technology to implement M-banking services this include.

SMS based application - In this technology M-banking services are offered via short message services using mobile phones. People knowing the phone number associated with the services send an SMS to this number with appropriate keywords and get back an answer by SMS. The reasons for the success of this technology are numerous: a) - easy for users – SMS of a mobile phone is very easy and natural for users; b) Availability on all phones – all phones can send and receive SMS; c) Low network requirements – SMS don't need high bandwidth; d) Low and predictable costs – the cost of sending SMS is clearly specified; e) free push mechanism - you receive the SMS free of charge. However there are some weaknesses associated with these services:-a) illiteracy of the population - in order to use these services people have to know how to read and write; b) Limited input capability of mobile phone – mobile phone keypads are very limited to typing information preventing quick entry of important data; c) Internationalization – only based on Latin characters, inputting and rendering non – Latin characters become a challenge; d) Limited user interaction :e) Lack of standardization for application development.

Voice based technology – that involves calling using your mobile to make transaction verbally. You can interact with a preset easy to follow pre recorded instruction that guide you on what to do. Strengths of voice based technology include- a) easy to use for illiterate people; b) easy input mechanism; c) Low and predictable cost; d) Low network requirements; e) Operator independence:

f) Standardized application development. However it has the following challenges – a) it is difficult to know of the existence of the services; b) Cost of application hosting is expensive; c) language barriers.

Web based technology - involve use of internet browsers to interact and make transactions. This involves logging to the bank providing the banking services web site using a mobile phone or a personal digital assistant. Strengths of web based technology – a) Operator independence; b) Easy development of services; c) Easy hosting and deployment; d) Good user interface. The Challenges of web based technology include – a) Cost of data access might be expensive; b) Availability of high capacity network and high end handsets; c) sometimes the services may be slow or unavailable.

2.3.3 Implementation of mobile banking systems

According to Yeates (2001), implementation of systems involves a collection of activities that are aimed operationalizing a new system in an organization. This involves a number of activities that include:-

Seeking approval from management to implement the new system - Before any new major system is implemented, management approval is important as the managers hold the key to resources and even staff needed to implement the system. Their consent must be sort before the successful implementation of any new system. Managers can hinder the successful implementation of any system whenever they feel that the process does not involve them or even consider their input. At every stage of development managers need to be involved and their opinion sought.

Acquiring and setting in place the required hardware and software system - These involve the purchase and installation necessary hardware and software needed to implement the system. Acquisition is usually done through a competitive bidding process that involves invitation of bids from potential supplier and selecting the supplier who best meet our criteria. Successful bidders will be chosen based on the suitability of the hardware and software provided to the organizations need also financial consideration can be used to choose potential suppliers from amongst the many. In some cases there is a need to conduct bench mark test to verify the specifications and also to compare performance across a number of potential hardware and software

Testing the system - To ensure no errors or minimal acceptable error levels exist, testing is an integral activity of any new system. Before a complete roll out, a system should be tested to ensure that it performs according to expectations and yields the correct results. Any errors present are identified and removed. Testing should involve users as their input is important to the testing process.

File conversion and database preparation - This involves ensuring that the files to be used in the new system are in a compatible format of the new system. Old file have to be redesigned and filled with data in the format of the new system. A number of techniques can be adopted for file conversion organization can choose from straight file conversion or dummy file conversion.

Using the agents of change – These represent influential group of people and other leaders in the organization who have capability to easily influence members on issue relating to a new system. They are selected and trained to spearhead the implementation of the new system any new system. Agents of change are people with integrity and a lot of influence, they may however not hold any position in the organization, and it is only their influence and drive which is important for successful system implementation

Selecting and training the user - To ensure they know how to properly use the system the users of the system must be conversant with the new system to reduce errors and also to increase system usability and acceptance. Therefore selected users will have to be trained on how to use and operate the system and also on the business gains that the new system brings. Training can be conducted in a number of ways for instance through practical and demonstration, lectures, and video shows. Converting to a new system necessitates that system users be trained and provided with documentation (user manuals) that guides them through using the new system.

Launching the new system – Once one is sure that the system is operating properly and without errors then the system is launched and it is rolled out for use this is called going live. A number of techniques can be used to change over, direct, parallel, phased or pilot changeover.

After going live and as the system is continuing to be used new challenges and errors might arise which need the support of the developers. Therefore a post implementation support team can be set up to provide remedial action for such errors and problems

James O'Brien (1993) describes implementation as doing what you planned to do. Therefore implementation is an important activity in the deployment of IT to support an organization and its end users. O'Brien summarizes implementation activities as involving acquisition of hardware and software and services, software development or modification, end user training, system documentation and conversion.

Whitten and Bentley (2000) define implementation as the delivery of a system into production i.e. day to day operation. They specify the following activities of implementation:
Conducting system test - This involves testing all software packages, custom built programs and any existing programs that comprise the new system.
Testing is carried out by analysts, owners, users and builders; each playing a unique role the system analyst typically communicates testing problems and issues with the project team members. The system owners and users hold the ultimate authority on whether or not a system is operating correctly. System builders are included in system testing.

Testing is a repetitive process carried out using test data (data specifically designed to exercise a system with a view of finding errors) developed by analyst. If errors are found they are corrected and the system is re tested.

Prepare conversion plan - Once a successful system has been completed we can begin preparation to place the new system into operation. A system analyst will develop a detailed conversion plan that includes identifying databases to be installed, end user training and documentation that need to be developed and a strategy for converting from old to new system . A variety of conversion techniques can be used such as direct or parallel or pilot or phased. The conversion plan also typically includes a system acceptance test plan. A system acceptance test plan is a final system test performed by end users using real data over an extended time period. It is an extensive test that addresses three levels of acceptance testing.

Verification testing - That involves running a system in a simulated environment using simulated data. It is aimed at looking for errors and omissions regarding end udders and design specification errors. Validation testing - Validation testing runs the system in a live environment using real data to test system performance (throughput and response time), peak working load performance, usability test and many more. Audit testing - It can be optional but it involves certifying that the system is free of errors and is ready to be placed into operation

Install databases - This involves fully loading and populating the databases with existing data from the old system. System builders can write special programs that extract databases from existing databases and programs to populate the new database. The principal deliverables of this task is the restructures existing data has been populated in the databases for the new system
Train users - Converting to a new system necessitates that system users be trained and provided with documentation (user manuals) that guides them through using the new system. Training can be done using a variety of methods and approaches depending on the type of system being installed and end users must be involved because they will inherit the success and failures from this effort.

Convert to new system - Conversion to new system from the old system is a significant milestone. After conversion the ownership of the system officially transfers from the analyst and programmers to the end users. This task involves all stakeholders and the principal deliverable is an operational system that is placed into production in the business.

Laudon and Laudon (2005) state that the first step in implementing a system solution is to create detailed system design specifications. System designs shows how the chosen solution should be realized. It consists of all specification that addresses all of the system solution.
They specify that other implementation activities include hardware selection and acquisition. testing. training and documentation and production and maintenance.

2.3.4 Challenges of Implementing Mobile Banking

Cadle and Yeates (2001) list the major challenges as including:-

a) Lack of management support – without the support and full involvement management the implementation of M-banking system cannot be a reality; b) Lack of user involvement – users should be involved to ensure the new system is usable and widely acceptable to everyone; c) Resistance to change – introducing a new system bring about anxiety and uncertainty that may cause the system to be rejected; d) Lack of change management program – an effective change management program will prepare both the users and even the customers for the launch of a new system; e) Skills and Technological challenges – the implementation of the new system requires new skills and this may not easily and readily available; f) Communication barriers – These occurs where the channels of communication followed are not up to task, the right information does not flow to the all the stakeholders to make informed decisions; g) Lack of proper risk management – any new system has its inherent risks that have to be seriously considered and corrective actions taken otherwise the system will fail; h) Security problems – these is where people access the system without authority and perform illegal activities such as fraud and sabotage; i) Regulatory challenges – new industry and government regulations can affect considerably the implementation of new financial services such as M-banking.

Tiwari and Buse (2007) define the challenges of mobile banking to include: *Interoperability* - There is a lack of common technology standards for mobile banking. Many protocols are being used for mobile banking – HTML, Wireless Application Protocol WAP, extensible mark up language XML to name a few. It would be a wise idea for the vendor to develop a mobile banking application that can connect multiple banks. It would require either the application to support multiple protocols or use of a common and widely acceptable set of protocols for data exchange.

There are a large number of different mobile phone devices and it is a big challenge for banks to offer mobile banking solution on any type of device. Some of these devices support java 2000 millennium edition J2ME and others support WAP browser or only SMS. The desire for interoperability is largely dependent on the banks themselves, where java enabled applications are of better security, easier to use and offer development of more complex transactions similar to that of internet banking while SMS can provide the basics but becomes a hassle to operate with more difficult transactions.

Security - Security of financial transaction, being executed from some remote location and transmission of financial information over the air, are the most complicated challenges that need to be addressed jointly by mobile application developers, wireless network service providers and the bank's IT department. The following aspects need to be addressed to offer a secure infrastructure for financial transaction over wireless network: Physical security of the hand-held device. If the bank is offering smart-card based security, the physical security of the device is more important. , Security of the thick-client application running on the device. In case the device is stolen, the hacker should require ID/Password to access the application. , Authentication of the device with service provider before initiating a transaction. This would ensure that unauthorized devices are not connected to perform financial transactions. , User ID / Password authentication of bank's customer.

Scalability & Reliability -Another challenge for the Chief Information Officers of the banks is to scale-up the mobile banking infrastructure to handle exponential growth of the customer base. With mobile banking, the customer may be sitting in any part of the world (a true anytime, anywhere banking) and hence banks need to ensure that the systems are up and running in a true round the clock fashion. As customers will find mobile banking more and more useful, their expectations from the solution will increase. Banks unable to meet the performance and reliability expectations may lose customer confidence.

Application distribution - Due to the nature of the connectivity between bank and its customers, it would be impractical to expect customers to regularly visit banks or connect to a web site for regular upgrade of their mobile banking application. It will be expected that the mobile application itself check the upgrades and updates and download necessary patches. However, there could be many issues to implement this approach such as upgrade / synchronization of other dependent components.

Personalization - It would be expected from the mobile application to support personalization such as: Preferred Language, Date / Time format, Amount format, Default transactions, Standard Beneficiary list and Alerts e.t.c.

DFID report (2006) indicates that Most African providers of m-payments and M-banking services reported that the major barriers to their growth related to; (i) uncertainties over customer adoption, which is common at an early phase of market development ; (ii) specific regulatory issues such as remote customer due diligence requirements and access to the payments system ; (iii) Uncertainties over the speed and nature of customer adoption: this is to be expected with any new offering, although the uncertainty is compounded by the relative lack of knowledge of the needs of unbanked people in many places, and the market potential.

The Researchandmarkets research and market organization through their web site (see http://www.researchandmarkets.com/reports/641/banking_on_wireless_european_banks_blaze_the.htm 08/04/08) define one of the major challenge faced by the banks as that mobile network operators are also keen to have a share of the lucrative M- banking market. Many operators who have spent billions of shillings on third-generation mobile phone licenses are now desperate to find ways of recouping their money - and some experts expect many operators to apply for banking licenses in the future. The site mention that *Immature Market* - is another challenge as the mobile banking environment is still yet to develop to a viable and sustainable market that can attract and support serious industry players such as big bank with huge capital base. It is still not a profitable venture. *Illiterate or older generation-* pose a challenge as they have difficulties that include language barriers, technophobia and they take time before being able to use the technology. Finally they pin point that *Cost issues* such as whether the technology is as cheap as normal banking services can pose a challenge in it quick growth.

Finally Laudon and Laudon (2005) also give a clear problem area of mobile banking that includes the following weaknesses, keyboards and screens on cell phones are still tiny and awkward to use, the data transfer speeds on 2G cellular network are very slow compared to dial up and high speed internet connections for PCs, each second waiting for data to download costs the customer money, most internet enabled phones have limited memory and power supplies most content for wireless devices is in the form of test with very little graphics.

2.4 Mobile Banking Adoption

(See http://project.hkkk.fi/helsinkimobility/papers/Mobile%20Applications_1_2.pdf 04/03/08)

The number of mobile phone users worldwide reached the one billion mark in 2002 (Barnes & Huff, 2003). In Japan, already seven out of 10 people have cell-phone accounts, and in countries such as Italy, Norway, Sweden and the United Kingdom, the market penetration of mobile phones has already exceeded 100% (Sultan & Rohm, 2005). One of the first commercial applications of the mobile commerce was mobile banking (M-banking) (Barnes & Corbitt, 2003; Laukkanen & Lauronen, 2005). M-banking is a further development upon earlier customer channel extensions such as phone banking and online banking (Barnes & Corbitt, 2003; Laukkanen & Lauronen, 2005; Pousttchi & Schurig, 2004). It can be defined as a channel whereby customers interact with a bank through a mobile device (e.g. cell phone or PDA) (Scornavacca & Barnes, 2004). Recent studies by Scornavacca and Barnes (2004) and Scornavacca and Cairns (2005) explored the state-of the-art of mobile banking in Japan and New Zealand. The investigations found that the Japanese banks had recently embarked on a multi-channel strategy that combined telephone banking, Internet banking, and M-banking services while in New Zealand M-banking remains in an embryonic stage.

In Europe, mobile penetration rates are around 80% and Germany is the largest European mobile market with 50 million mobile users (Forrester, 2005b).

Accessing M-banking services -In order to access M-banking services, customers should own a mobile handset and subscribe to a wireless service provider (WSP). In Germany, there are four major wireless services providers: T-mobile, Vodafone, E-Plus, and O2.All German WSPs have recently introduced 3G/UMTS services. The new data transmission rates appear to close the existing gap between "wired" Internet access and mobile Internet. For instance E-Plus offers a "flat rate" for unlimited data transmission with transfer rates up to 384 Kbits/s (E-Plus, 2006).
Apart from general data/network usage none of these four network providers charges customers for M-banking services separately. All of the banks have websites that can be viewed from any device, independently of the wireless service provider. In a study out of 100 banks only 30 banks investigated were identified to be offering some kind of mobile service. Interestingly, almost half of them (14) were only offering the service of recharge of mobile prepaid cards.

Moreover, two banks only offered to their customers a service that can hardly fit in the definition of M-banking: the download of ring tones. Surprisingly only 14 German financial institutions allow their clients to interact via the mobile channel. Three out of these 14 offered very simplistic SMS-notification services.

Most banks do not charge customers extra fees for SMS services. Online banking is utilized by only 30 percent of consumers (Forrester, 2005a). On the other hand, 52 percent of them still rely on traditional physical branch services to satisfy their banking needs – despite the fact that automated channels such as ATM's or online banking offer lower transaction fees (Forrester, 2005a).

Globacom in Nigeria provides Glo M-banking that provided unique service to all Glo Mobile banking customers making it swift and easy access to their bank accounts from their mobile phones within Glo coverage area. With the Glo M-banking service, subscribers can check their bank account balances, view the last five transactions on the account, transfer funds from one account to the other in the same bank, and recharge a Glo prepaid line all directly from their Glo Mobile phones. Offered in collaboration with InterSwitch, Nigeria's premier e-payment switch, Glo M-banking offers subscribers' access to real-time personal banking information and saves time and money.

At the moment the service is live in 16, top rated, high end banks. To access the service, the subscriber is required to register for the service at any of the participating banks that holds the account of the subscriber. All transactions are charged on "a per request" basis Although some banks currently run SMS based mobile banking services, the present offering by Glo Mobile has many advantages over what is currently available. Glo M-banking is not only menu driven, which makes it user friendly, it is more secure than any other before it.

To enhance its security, the service is tied to phone number and PIN and ensures due end to end security on all transactions. (See MobileAfrica.net 05/03/08)

2.4.1 Mobile Banking in Kenya

Quite a number of commercial banks are offering M-banking services in Kenya to sample but a few we have Sms banking offered by commercial bank of Africa CBA. CBA's SMS Banking has transformed the way banking is done in Kenya.

This service lets you access your account(s) via your mobile phone - quickly and conveniently - without the need to visit your branch. A complete package, with a host of benefits: Easy set-up, User-friendly and secure: The system uses PIN and phone number combinations to ensure maximum security, 24-hour access - no more space and time constraints. The transactions you can perform with CBA SMS Banking include Account balance enquiries and Mini-statement requests. (See http://www.cba.co.ke/default2.php?active_page_id 1/04/08)

National bank of Kenya NBK is offering SIM based mobile banking services called SIM-ple Banking. NBK SIM-plc Banking allows its customers to receive short messages on their mobile phones containing up to-date information about latest transactions on their Accounts, as well as information about new developments on products and services offered by National Bank. Services include; checking account balance and paying utility bills, request for statements, obtain interest and exchange rates, order cheque books, stop cheques, transfer funds, change pin; all around the clock and from wherever . (See http://www.nationalbank.co.ke/ 10/05/08). Kenya Commercial bank has not been left out too (See http://www.kcb.co.ke/about/history.asp 08/04/08) they have just introduced a new Mobile banking Service that will enable its customers to carry out their transactions without visiting the banking halls mobile banking (Written By: Boniface Mutakha, Posted: Thu, Apr 20, 2006 on the KBC website).

2.5 M-banking and mobile phone operators

MPESA by Safaricom - From this web site (see http://www.safaricom.co.ke/m-pesa/ 10/05/08) and DFID report (2007) , Mobile banking has the potential to offer low cost, easily accessible financial services to poor people in Africa and other developing countries that do not have bank accounts, DFID report (2007). Mobile phones evolve at a frantic pace with new innovations constantly springing up. One new idea is to use mobile phones to provide banking services such as savings accounts, small loans and transfer services – sometimes referred to as Mobile phone banking or M-banking.

It is a mobile payment solution in Kenya that allows customers to complete simple financial transactions using their mobile phone. M-PESA targets mobile phone customers who live far away from the nearest bank branch or who cannot afford the charges associated with opening a bank account.

Originally piloted in 2003 with joint funding from Vodafone and DFID's Financial Deepening Challenge Fund (FDCF), M-PESA was launched as a commercial mobile banking service in Kenya in April 2007.

Mobile phone operators used to see Africa as too risky an investment. Since then, a shift in perception has allowed the African continent to achieve the world's fastest growth in mobile phone ownership. The number of African mobile phone subscribers leapt from 8 million in 1999 to nearly 80 million in 2004, and is expected to increase to 250 million by 2008. In its first three months of commercial operation, M-PESA attracted 95,000 customers. Currently it has a customer base of 3 million plus with a total transfers of Kenya shillings 36 billion. With nine out of ten people in most developing countries having limited or no access to a bank account or basic financial services, M-banking products like M-PESA provide an opportunity to tap into a market and provide affordable access to financial services to vast numbers of poor people. Improving access to financial services, such as savings accounts, small loans, insurance, bill payments and remittances is vital to reducing poverty. With the international remittance market worth 1.4 trillion shillings a year, the potential benefits to poor people living in developing countries are huge.

Soko Tele by Zain

(See http://www.entrepreneur.com/tradejournals/article/173102187.html24/08/08) Zain launched Soko Tele, a brand new remittance service a few years ago. It was a development between Zain, K rep, a local bank, and the public data network operator Packet Stream. Relying on payphone technology, it allowed Zain mobile subscribers with handsets a cheap and efficient way to send money to friends and relatives across the country. K-rep, one of Kenya's foremost micro-finance organisations, was to provide the banking expertise, the vending software was to be supplied by Packet Stream and the connectivity was made possible over Zain Kenya's cell phone network. The system was to rely on an extensive network of public payphone-type units, each fitted with a non-removable Zain SIM card that can be operated by small one-person businesses.

Prospective Soko Tele payphone operators, typically store owners, filling station proprietors, were required to open a K-rep bank account to make a refundable deposit of Ksh 20,000 and will then need to pay Ksh30,000 for the Soko Tele unit.

Existing mobile pay-phone operators using Zain's one4all payphone equipment can have their units adapted, at a reduced cost, to be Soko Tele-compliant. There are already more than 300 Soko Tele units operating around the country and more than Ksh500,000 has been moved by the network. The actual cost of the transaction, a flat rate Ksh 120 for any sum up to the limit of Ksh5,000 for any single transaction, can be either paid by the sender, the receiver or halved fifty-fifty. There is a clear need for this service. Research undertaken by Zain Kenya indicates that about 20,000 money transfer transactions are undertaken every day across the country, and that nearly half of these are made through informal channels such as using friends and relatives. Soko Tele recognizes that while mobile telephone penetration is growing fast, it still only amounts to 20 per cent of the population and the remaining 80 per cent need remittance services. The service however has faced challenges and is not operational in most Zain dealers' shop the dealers cited a number of problems that include poor customer take up and high charges. Since most Zain customers have Safaricom numbers in their handset they wanted a possibility of remitting money to the other network a technicality that has also contributed to slow uptake. Finally the numbers of agents offering the services have been few making the services difficult to find at the time of need.

2.6 The banking sector in Kenya

Kenya has a total of 43 commercial bank with equity bank having the largest customer base of around 2 million account holders (see equity bank website 07/04/08). For a listing of all commercial banks in Kenya see appendix I. Latest advertisement in the daily nation 08/04/08 show a major shift in services offered by commercial banks most are now offering mobile banking M-banking and mobile brokering M-brokerage services which were mostly a preserve of investment banks such a FAIDA investment bank. The central bank report (2006/2007) indicates that most banks are embracing new ICT services in their effort to remain competitive and also attract new customers. This adoption of new ICT technologies is very visible from the increased use of ATMs and increased provision of e-banking systems such as internet banking, SMS banking and mobile banking.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This was a census survey that collected data from the entire population of the 43 commercial banks in Kenya. Each bank was given only one questionnaire. The choice of census survey was because of the size of the population which was small and the fact that population was mainly concentrated in Nairobi making it easy and cost effective to contact them. Moreover Nairobi is a cosmopolitan city with different diversity hence can comfortably represent the whole population. Self administered questionnaire was given to all the expected respondents. The variable were assessed using descriptive measures, according to sekaran, (2003) a descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variable of interest in a situation. Nolde(2006) and Khainga(2006) have also used such studies in their research successfully.

3.2 Population of Study

The population of study was comprised all of 43 commercial banks listed by the Central Bank Kenya CBK. These are organizations that are involved in providing financial services to clients. The entire population was chosen because only one questionnaire were given to each bank therefore at total of 43 questionnaires were expected to be filled. The banking sector was selected largely because it has always taken a lead role in implementing new ICT services and systems, Nyambati (2001) and has always been willing to try new technology. Beside the banking sector is one of the sectors that has invest heavily in ICT systems (market intelligence report 2005)

3.3 Data Collection

Primary data was collected using part semi - structured questionnaire. First part of the questionnaire was aimed at gathering general information about the respondent and the financial institutions while the second part was to concentrate on gathering data related to the challenges of implementing mobile banking systems. The respondents were ICT managers or people with relevant M-banking background. IT managers were chosen given their role and position which give them ability to effectively respond to most the questions.

Beside IT managers are well versed with the technological changes in the field of ICT and are knowledgeable about new technologies such as mobile banking

3.4 Data Analysis

The collected data from the field was edited and screened for errors and omissions, accuracy, uniformity and completeness and then tabulated before analysis is carried out, Cooper and Emory (1995). Given that this was a descriptive design, data analysis was done using ratios, percentage and proportions to access the relative importance of various grouped factors. The basis of using descriptive measure was to give a basis for determining the weights of the variable under the study. A ranking based on likert scale is will also used to help analyze the data closely. Kibere (2003) and Ndole (2006) have used the likert scale in their studies successfully. Findings were presented using s, pie charts, and bar graphs for easier interpretation. Section one was analyzed using percentage and proportions and charts and graphs. While section two was analyzed also using percentages, proportions, means and standard deviation to identify the relative importance of the challenges.

CHAPTER FOUR: RESEARCH FINDINGS AND DATA ANALYSIS

4.1 Introduction

This chapter contains the detailed data analysis and findings of the study. The data was analyzed, summarized and presented in the form of s. frequency distributions, pie charts, bar graphs and percentages. A total of 31 questionnaires were satisfactorily filled and were therefore used in the analysis of data. These represented a response rate of 72% because the total number of respondents expected to have filled the questionnaire was 43 this is considered enough response to provide useful data for a successful analysis of findings. Of the remaining 12 questionnaires 9 were never returned and the rest 3 were not filled satisfactorily to be considered for analysis.

4.2 Demographic Profile of Respondents

Most of the respondents were males with a total proportion of 65% compared to female respondents who were 35% of the total respondents.

Table 2: Distribution of the respondent's gender

Gender	Number	Proportions
Males	20	64.52 %
Females	11	35.48 %
Totals	**31**	**100 %**

Source: Research Data

Figure 1: Graph of distribution of respondents by gender

Pie chart showing proportion of male and female respondents

Source: Research Data

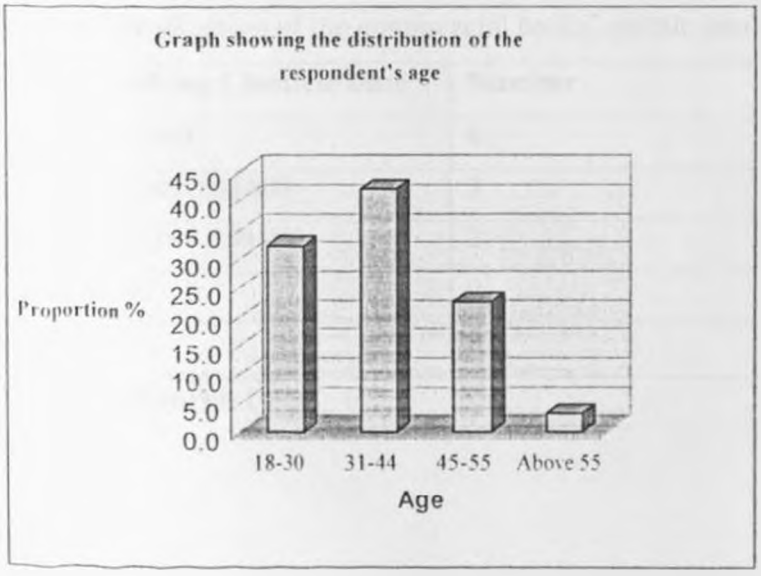
Majority (42%) of the respondents were in the age group 31 – 44 as indicated in Table 3; these were mostly young managers who do not make decisions at the board level since they mostly work at the middle level management as were evident in the distribution work position (Table 4) where majority 52% of the managers were middle level managers and only 16% were in the senior level. This might indicate the slow implementation pace of mobile banking information system since the people with the right kind of information on mobile banking are not at the board level where most of the decisions are made and agreed upon.

Table 3: Distribution of the respondents' Age group

Age group	**Number**	**Proportions**
18-30 years	10	32.26 %
31-44 years	13	41.94 %
45-55 years	7	22.58 %
Above 55 years	1	3.23 %
Totals	**31**	**100 %**

Source: Research Data

Figure 2: Graph of respondents' Age group



Source: Research Data

Table 4: Distribution of the respondent's Work position

Work position	Number	Proportion
Line level manager	10	32 %
Middle level manager	16	52 %
Senior level manager	5	16 %
Totals	**31**	**100 %**

Source: Research Data

4.3 Commercial banks clientele base distribution

Mobile banking uptake is still at infancy as shown in the Table 5 and Table 6 most commercial banks have very few mobile banking clienteles in comparison to the total no of clientele that the banks have. Majority of commercial banks have about 50,000 mobile banking customers compared to about 500,000 total number of customers (a ratio of 1:10) this is an indication of the slow uptake of mobile banking services, making it difficult for managers to seriously consider it as product of the future and in turn slowing down it is implementation and eventual adoption, since to the managers it does not make a lot of business sense why spend effort and resources on a non lucrative venture.

Table 5: Distribution of the commercial banks' mobile banking clientele base

Mobile banking Clientele base	Number	Proportions
Less than 50,000	8	47.06 %
Between 50,001-100,000	7	41.18 %
Between 100,001-200,000	2	11.76 %
Over 200,000	0	0.00 %
Totals	**17**	**100 %**

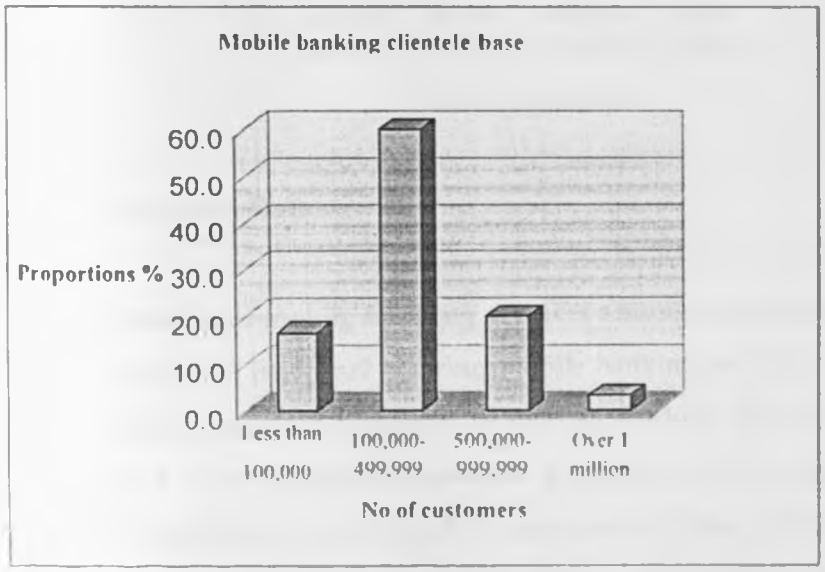
Source: Research Data

Table 6: Distribution of commercial bank clientele base

Clientele BASE	Number	Proportions
Less than 100,000	5	16.67
Between 100,000- 499,999	18	60.00
Between 500,00-999,999	6	20.00
Over 1 million	1	3.33
Totals	**30**	**100%**

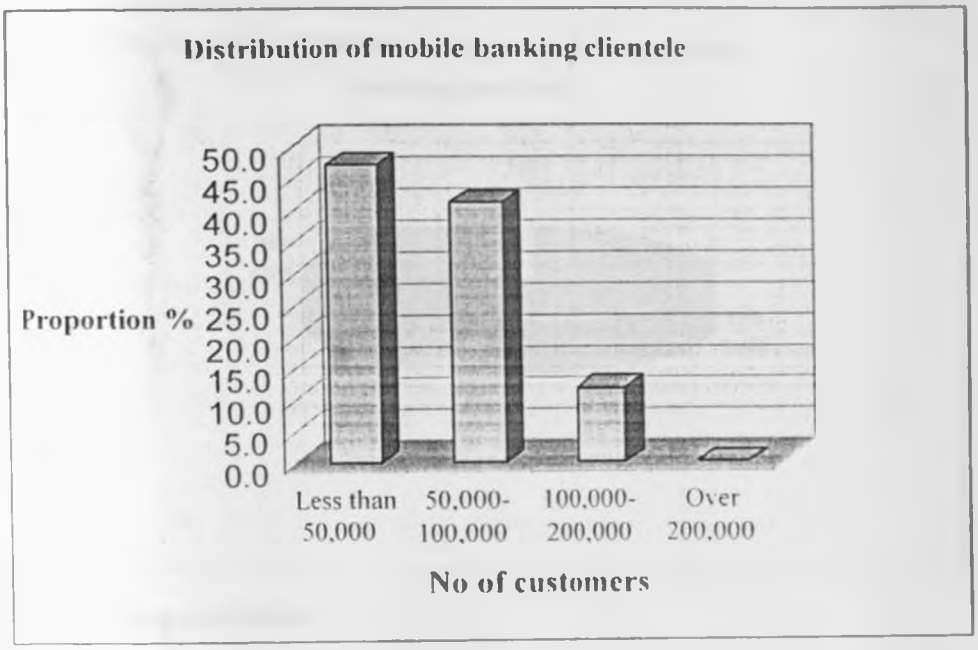
Source: Research Data

Figure 3: Graph of commercial bank clientele base



Source: Research Data

Figure 4: Graph of commercial banks' mobile banking clientele



Source: Research Data

4.4 Distribution of mobile banking services among commercial banks in Kenya

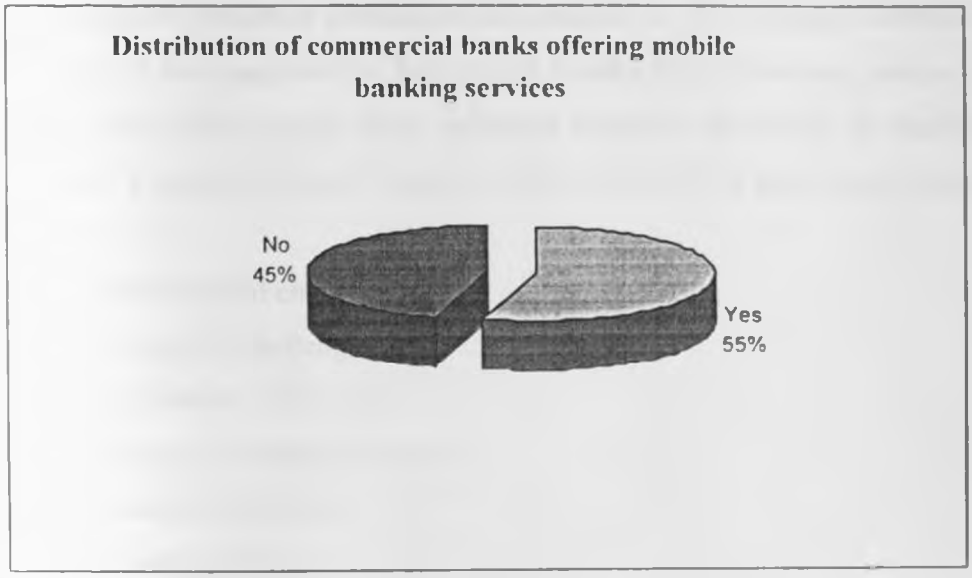
Many commercial banks are offering mobile banking services with up to 55% of banks offering mobile banking services compared to only 45% which are yet to offer mobile banking services see Table 7. This number is however expected to grow since majority of the respondents indicated that although their banks do not currently offer mobile banking plans are under way to offer the services as soon as possible. Despite the number of banks offering mobile banking services being high, they have not been offering the services for a long time. Many banks 94% have only been offering these services for last five years and out of this almost 47% have been offering the services in the last one year. This is indicating a rush for implementation of mobile banking information systems.

Table 7: Distribution mobile banking services among commercial banks

Service offered	Number	Proportions
Offer mobile banking services	17	54.84%
Does not offer mobile banking services	14	45.16%
Totals	**31**	**100%**

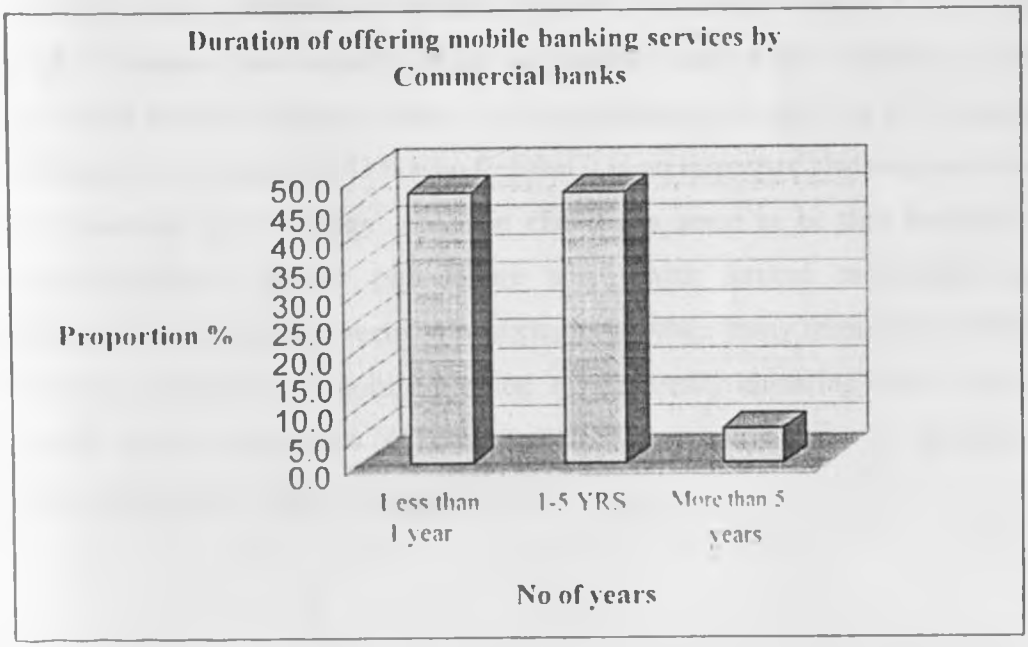
Source: Research Data

Figure 5: Graph showing commercial banks offering mobile banking services



Source: Research Data

Figure 6: Graph showing duration that commercial banks have been offering mobile banking services



Source: Research Data

4.5 Challenges in the adoption of mobile banking

The descriptive statistics focused on an analysis of the grouped variables in order to get the indication of the magnitude of importance attached to the various groups variables provided in the list. These data groups were identified based on groupings of challenges as indicated by Cadle and Yeates (2001) and Tiwari and Buse (2007). The main groups were therefore classified as follows

a) Technological challenges
b) Managerial challenges
c) User related challenges
d) Employee related challenges
e) Financial challenges
f) Security challenges
g) Legislative challenges

4.5.1 Technological challenges

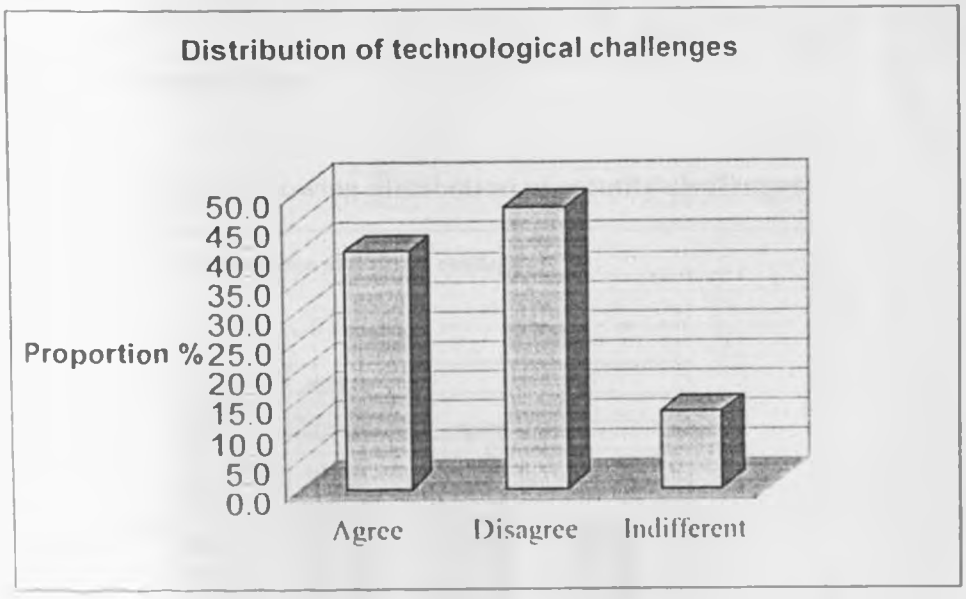
Overall it can be said that banks have the necessary capability and technical know how to implement mobile banking information systems as shown by a mean score of 1.73, which in the likert scale of 1-3 means that majority of the respondents agreed that technology was not a challenge to mobile banking implementation. The proportions indicated that 47% agreed that it was not a challenge as compared to 43% who feel that it is an important challenge as indicated in the Table 8. However in technology the main challenges seem to be that handheld mobile banking devices such as mobile phones are small with limited capabilities and also interoperability with other systems seem to be a challenge since many respondents 48% against 38% agreed on the difficulty of mobile banking system easily operating with other banking systems. Finally many respondents 48% agreed that frequent changes to mobile banking application may cause a challenge compared to 38%.

Table 8: Distribution of the technological challenges

Technological challenges	Agree	Disagree	Indifferent	Mean	STDEV
This bank lacks the technical resources necessary to implement mobile banking	16.67	66.67	16.67	2.00	0.577
The staffs don't have the skill required to implement mobile banking	19.35	58.06	22.58	2.03	0.647
Mobile banking application software frequently changes requiring that customers always update their software	48.28	37.93	13.79	1.66	0.708
Mobile banking systems is not compatible with other banking systems	20.69	65.52	13.79	1.93	0.583
Handheld mobile banking devices such as mobile phones are small with limited capabilities	54.84	32.26	12.90	1.58	0.708
Interoperability (does it work with other systems)	48.39	38.71	12.90	1.65	0.698
Mobile banking system are not reliable	20.00	66.67	13.33	1.93	0.573
Poor IT infrastructure prevent the growth of mobile banking	55.17	34.48	10.34	1.55	0.674
Proportions	**40.00**	**47.33**	**12.67**	**1.73**	**0.6723**

Source: Research Data

Figure 7: Graph of showing distribution of technological challenges



Source: Research Data

4.5.2 Security challenges

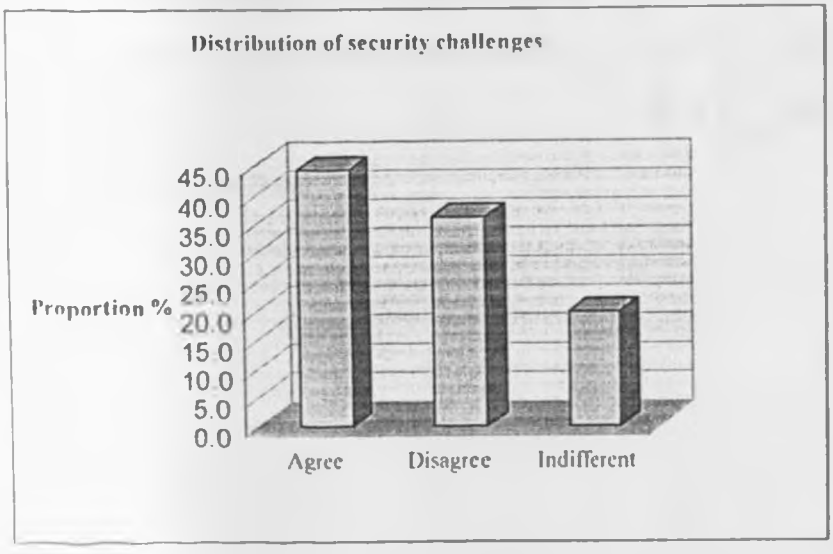
The likert scale of 1.4 indicates that security is a challenge to implementation of mobile banking. Security presents itself as one of the main challenge in the implementation of mobile banking information systems many respondents 44% have the view that it is a serious challenge compared to about 36% who don't see these as challenge (Table 9). The major security fears are that there are no proper controls; fear of fraud and that mobile banking system are not secure.

Table 9: Distribution of security challenges

Security challenges	Agree	Disagree	indifferent	Mean	Std dev
Mobile banking systems are not safe clients and the bank can lose money to fraudster	48.39	32.26	19.35	1.4	0.7702
I perceive risk in mobile banking	32.26	38.71	29.03	1.5	0.7822
People distrust the mobile banking technology	46.67	36.67	16.67	1.4	0.7371
The bank does not provide customer protection against loss of money	32.26	51.61	16.13	1.5	0.6767
Security fears there are no proper controls in mobile banking	63.33	23.33	13.33	1.3	0.7188
Fear of fraud and loss of investment prevent successful implementation	56.67	20.00	23.33	1.4	0.83
The bank does not provide protection against loss of money	32.26	51.61	16.13	1.6	0.6767
Mobile banking is less secure	43.33	33.33	23.33	1.5	0.7916
Proportions	**44.26**	**36.07**	**19.67**	**1.4**	**0.7608**

Source: Research Data

Figure 8: Graph of showing distribution of security challenges



Source: Research Data

4.5.3 Legislative challenges

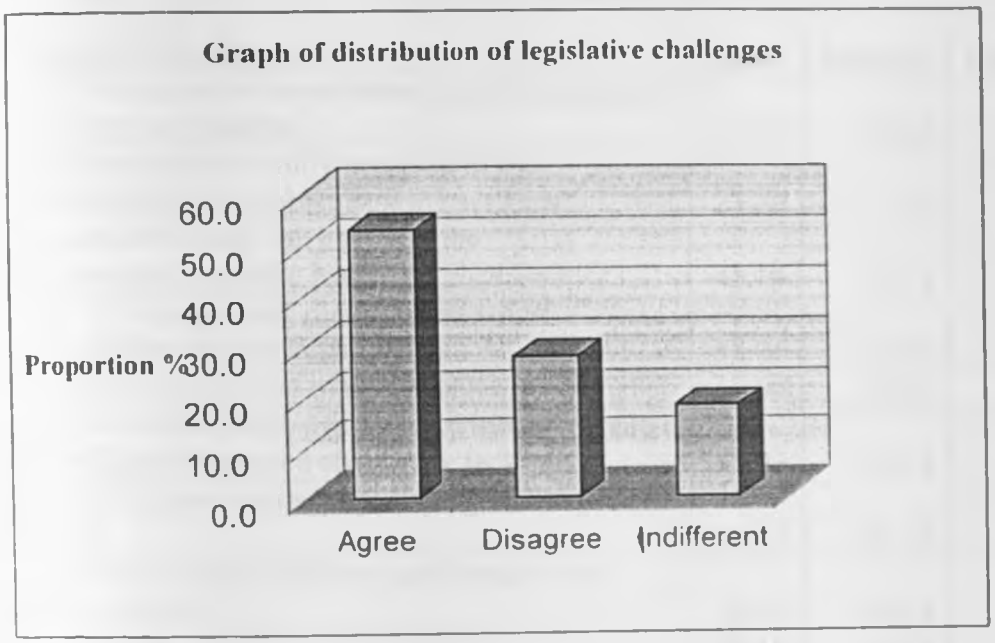
Legislation is a challenge to the implementation of mobile banking information system. The mean of 1.4 on the likert scale support this fact. Security pose one of the serious challenges in the implementation of mobile banking information system: with a total of 53% of respondents supporting this assertion compared to only 28% who do not agree see Table10. In fact all issues in legislation seem to pose challenges for the proper implementation of mobile banking information systems. These range from lack of regulation to banks jurisdiction not clearly defined in implementing mobile banking. Others challenges include the fact that there are no clear laws governing use and implementation of mobile banking up to 62% support this fact compared to only 14% who disagree. However it worth noting that banks on their part are doing something about these many banks 53% are accepting liability for loss of customers money compared to only 33% who do not accept.

Table 10: Distribution of legislative challenges

Legislative challenges	**Agree**	**Disagree**	**indifferent**	**Mean**	**Std dev**
Regulatory barriers affect it is successful implementation	54.84	25.81	19.35	1.4	0.7849
Mobile banking systems are not regulated	60.71	21.43	17.86	1.3	0.7759
Banks jurisdiction is not defined in mobile banking	56.67	26.67	16.67	1.4	0.7572
There are no clear laws governing mobile banking	62.07	13.79	24.14	1.3	0.8475
The bank does not accept liability incase of loss	33.33	53.33	13.33	1.8	0.6532
Proportions	**53.38**	**28.38**	**18.24**	**1.4**	**0.7699**

Source: Research Data

Figure 9: Graph of showing distribution of legislative challenges



Source: Research Data

4.5.4 Managerial challenges

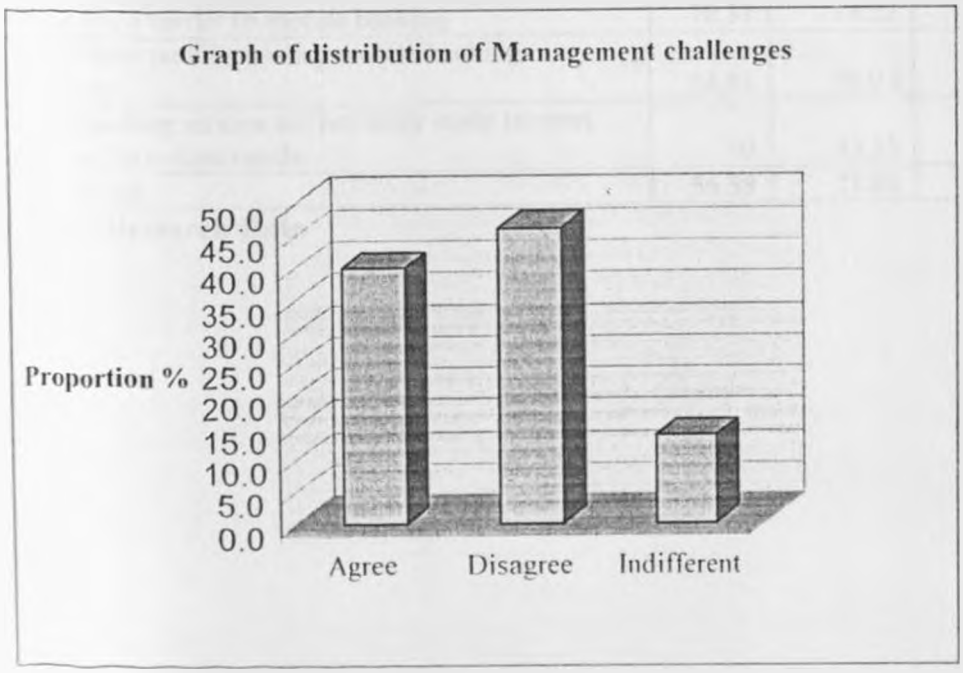
The likert scale means of 1.7 indicates that managers do not challenge the implementation of mobile banking information system. Managers are not a challenge to the implementation of mobile banking system as about 46% support this fact compared to 40% who do not support this fact. Many managers 58% show commitment to successful implementation of mobile banking information systems as compared to only 35 % who are not supportive Table 11. However the data indicate that managers do not fully consider the risks associated with the implementation of mobile banking information system and if not carefully considered this might turn out to be a challenge an assertion supported by 58% and not supported by 32%.

Table 11: Distribution of the managerial challenges

Managerial challenges	Agree	Disagree	Indifferent	Mean	Std dev
Senior management commitment to development of new systems is lacking	35.48	58.06	6.45	1.7	0.579
Management are not fully involved in the implementation of mobile banking systems	23.33	60	16.67	1.9	0.628
Management do not fully support the implementation mobile banking	45.16	38.71	16.13	1.7	0.727
There is no proper risk management when implementing mobile banking	58.06	32.26	9.68	1.5	0.665
Immature markets , the market is still not yet viable	58.06	29.03	12.9	1.5	0.711
Proper communication systems that inform people and staff about the need change are lacking	37.93	41.38	20.69	1.8	0.746
This organization lacks proper change management strategy	26.67	63.33	10	1.8	0.582
It is difficult to win customer confidence to use mobile banking	35.48	48.39	16.13	1.8	0.691
Proportions	**40.16**	**46.31**	**13.52**	**1.7**	**0.682**

Source: Research Data

Figure 10: Graph of showing distribution of managerial challenges



Source: Research Data

4.5.5 User related challenges

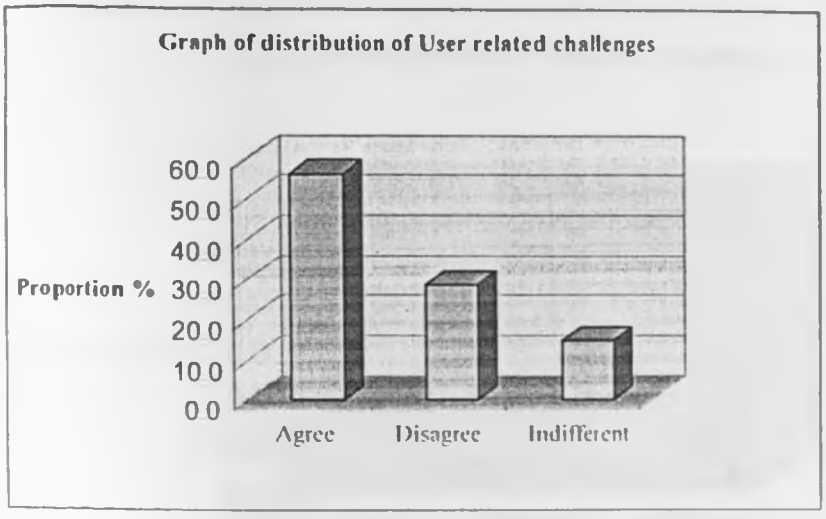
Users support do not support successful implementation of mobile banking information systems this fact is supported by a mean 1.4 score on the likert scale. Although the mobile banking system will eventually benefit them, the users seem to be one of the main challenges in the successful implementation of mobile banking systems. in fact upto 56% of respondents feel that they are a serious challenge compared to only 29% who feel otherwise. They are apprehensive of the services; slow in up taking the services 56% of the respondents agree to this fact while 20% do not agree as indicated in Table 12. Illiteracy is also a factor affect user adoption of this technology making them become implementation barrier. The aged seem not to like new technology and therefore are slowly to adopt it actually up to 55% have problems using mobile banking technology compared to only 29% who are comfortable with the technology and majority of these are young people.

Table 12: Distribution of user related challenges

User related challenges	Agree	Disagree	Indifferent	Mean	Std dev
High uncertainty over customer adoption of mobile banking services	56.67	20	23.33	1.3	0.830
It appeals mostly to the young	51.61	32.26	16.13	1.4	0.743
Illiteracy is a barrier to mobile banking	70.37	18.52	11.11	1.2	0.681
The old have problems using mobile banking technology	54.84	29.03	16.13	1.4	0.748
Mobile banking service are not tailor made to meet individual's unique needs	50	43.33	6.67	1.4	0.616
Proportions	**56.38**	**28.86**	**14.77**	**1.4**	**0.734**

Source: Research Data

Figure 11: Graph of showing distribution of user related



Source: Research Data

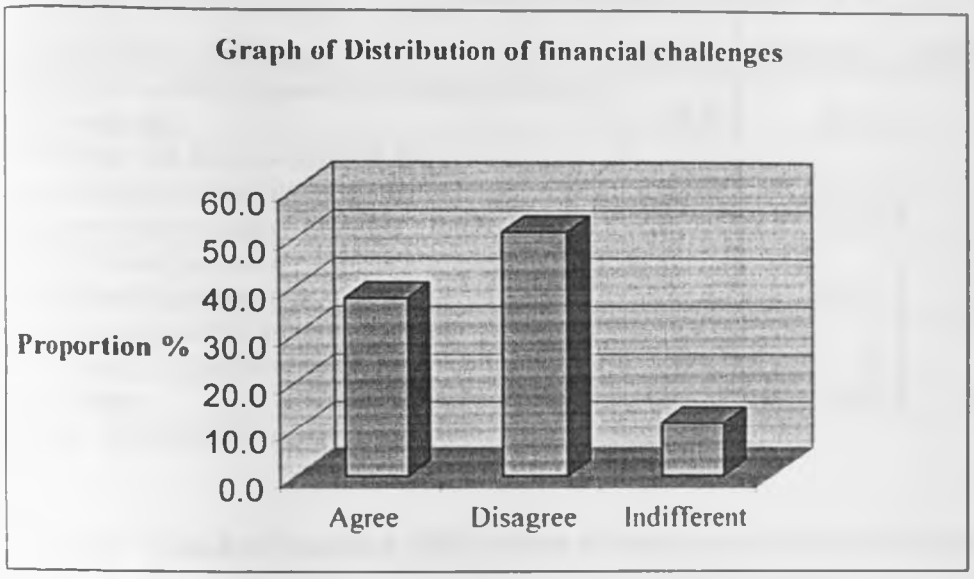
4.5.6 Financial related challenges

Financial challenges are not an impediment to the successful implementation of mobile banking information systems as indicated by likert scale mean score of 1.7. Banks have proved money cannot be a challenge to any new and good technology and many 51% have shown that they have the financial capability to successfully implement a new technology such as mobile banking information systems this is despite the fact that mobile banking system require new and expensive equipment. Table 13 shows that 72% of the respondents confirm that their banks have the necessary financial resources to successfully implement mobile banking against only 21% who do not agree.

Table 13: Distribution of financial challenges

Financial related challenges	Agree	Disagree	Indifferent	Mean	Std dev
This bank lacks the financial resources necessary to implement mobile banking	20.69	72.41	6.9	1.9	0.507
Cost of mobile banking services is prohibitive	33.33	50	16.67	1.8	0.687
Mobile banking require new and expensive equipment	58.62	31.03	10.34	1.5	0.676
Proportions	**37.5**	**51.14**	**11.36**	**1.7**	**0.648**

Figure 12: Graph of showing distribution of financial challenges



Source: Research Data

4.5.7 Employee related challenge

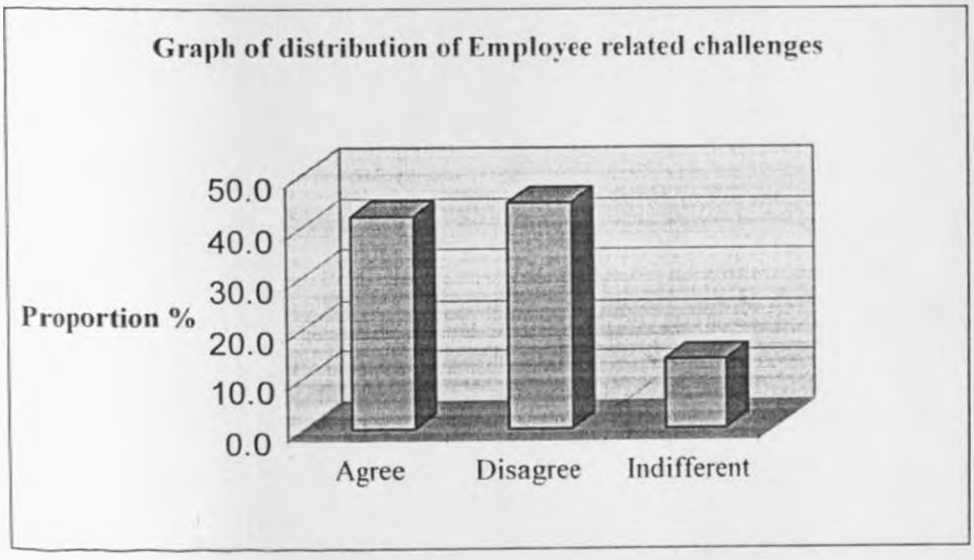
Employees are supportive of a successful implementation of mobile banking information system this is shown by likert scale of 1.7. Employees ensure successful implementation of mobile banking majority 44% of the respondents feel that employee do not pose any serious challenge as compared to 42% who feel otherwise. However many employees 48% do not fully support implementation of mobile banking systems compared to 42% who support , moreover many employees 48% are never fully involved in the implementation process as compared to 38% who are usually involved. The involvement of employees is important to reduce resistance to the implementation process. The employees have the right attitude needed to implement mobile banking information system actually 48% feel very positive about it whereas 32% feel that mobile banking is not a good idea as indicated in Table 14 and Figure 13.

Table 14: Distribution of employee related challenges

Employee related challenges	Agree	Disagree	indifferent	mean	std dev
Workers do not fully support the implementation of mobile banking	48.39	41.94	9.68	1.6	0.656
Workers are not fully involved in the implementation of mobile banking systems	48.39	38.71	12.9	1.6	0.698
Employees have negative attitudes towards change	32.26	48.39	19.35	1.9	0.707
Lack of skilled personnel with the knowledge in mobile banking operations	43.33	43.33	13.33	1.7	0.691
Employee resistant to adopt the systems prevent it's successful implementation	36.67	50	13.33	1.8	0.667
Proportions	**41.83**	**44.44**	**13.73**	**1.7**	**0.690**

Source: Research Data

Figure 13: Graph of showing distribution of employee related challenges



Source: Research Data

4.6 Other challenges identified by respondents

Some additional challenges identified by the respondents included the fact reliable delivery of mobile banking system directly depend on the quality of service provision by mobile services providers such as Safaricom and Zain therefore if these services providers do not provide reliable services mobile banking information systems operation will also be affected; secondly the lack of a common platform that would allow for easy inter operability between mobile banking services among the commercial banks causes problem:

Thirdly poor attitudes by customers especially not trusting new technology and being used to paper money make them reluctant to adopt and successfully use mobile banking information services and finally fear of the legal and business repercussion of systems failure are some of the new challenges identified by respondents. The expensive communication on the part of the customers cost, slow and congested mobile networks was also identified as a challenge.

CHAPTER FIVE: CONCLUSION AND SUMMARY

5.1 Introduction

The main objective of the study was to investigate the challenges of implementing mobile banking information systems in Kenyan commercial banks. It focused mainly in mobile banking since these technology and service is pick up a high rate and many banks and financial institutions are under pressure to successful implement the system. The specific objective of the study was to investigate the challenges in the implementation of mobile banking information systems.

5.2 Discussion and Conclusion

Most of the respondents were males with a total proportion of 65% compared to female respondents who were 35% of the total respondents. Most (42%) of the respondents were in the age group 31 – 44; these were expected to be mostly young managers who do not make decisions at the board level. Mobile banking uptake is still at infancy and most commercial banks have very few mobile banking clienteles in comparison to the total no of clientele that the banks have. Majority of commercial banks are having about 50,000 mobile banking customers compared to about 500,000 total number of customers (a ratio of 1:10) this is an indication of the slow uptake of mobile banking information services by consumers.

The successful implementation of mobile banking is crucial for provision of mobile banking services. A number of factors pose challenge to the implementation, these factors include security, legislative and user related challenges. In security there is a strong feeling that mobile banking systems are not secure and reliable and also that financial institution are not doing enough to address these fears and challenges. The legislation that govern use and operation of mobile banking systems is still not clearly defined and that banks are not regulated on they way they can offer such services, however many banks that implement the system have in place measures to protect against fraud and loss of customers money. Users have not been keen on adopting mobile banking services this might because of security fears and the fact that they are still accustomed to the normal banking systems, another challenge posed by users is the fact that they are slow in adopting the new technological especially the old.

However the study overall noted that the following factors do not pose a challenge to the implementation of mobile banking information systems; managers, employees, finances, and technology. But for technological challenges it is worth not that specifically interoperability, poor infrastructure and nature of handheld devices are a challenge to successful implementation of mobile banking. In management lack of proper risk management and lack of support from top management are a serious challenge. For employees they do not fully support or participate in the implementation of mobile banking systems posing a challenge. Finally except for the fact that mobile banking systems are expensive to implement and require a lot of resources. commercial banks have shown that they have the capability to mobilize resources to implement mobile banking services.

5.3 Limitation of the Study

The study was largely successful; however some problems noted included the fact that banks were very reluctant to provide information citing many questionnaires they receive from various student and research organization and fear that the information provided can be used by their competitors. Time is also a constraint as a lot is expected within a short period of time. Mobile banking is still a new technology and getting literature material is a difficult task hence heavily reliance on internet material.

5.4 Recommendation for further research

Although many commercial banks have successfully implemented mobile banking information systems, this has not been without challenges. Studies can be conducted to identify factors that have contributed to the successful implementation of mobile banking a good example would be the case study of Safaricom which has successfully implemented M-pesa mobile financial services.

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APPENDIX I

List of commercial banks in Kenya

Commercial Banks

1. African Banking Corporation Ltd
2. Bank of Africa Kenya Ltd
3. Bank of the Bahamas Ltd.
4. bank of India Ltd
5. Bank of Baroda (K) Ltd
6. Barclays Bank Of Kenya Ltd
7. CFC Bank Ltd
8. Charterhouse Bank Ltd
9. Chase Bank (K) Ltd
10. Citibank N.A Kenya
11. City Finance Bank Ltd C
12. Co-operative Bank Of Kenya Ltd
13. Commercial Bank Of Africa Ltd
14. Consolidated Bank of Kenya Ltd
15. Credit Bank Ltd
16. Development Bank of Kenya Ltd
17. Diamond Trust Bank (K) Ltd
18. Dubai Bank Kenya ltd
19. East African Building Society
20. Equatorial Commercial Bank Ltd
21. Equity Bank Ltd
22. Fidelity Commercial Bank Ltd
23. Fina Bank Ltd
24. Giro Commercial Bank Ltd
25. Guardian Bank Ltd
26. Habib Bank A.G Zurich
27. Habib Bank Ltd
28. Industrial Development Bank

29. Investment & Mortgages Bank Ltd
30. K-Rep Bank Ltd
31. Kenya Commercial Bank Ltd
32. Middle East Bank (K)
33. National Bank of Kenya Ltd
34. National Industrial Credit Bank Ltd
35. Oriental Commercial Bank Ltd
36. Paramount Universal Bank Ltd
37. Prime Bank Ltd
38. Prime Capital and Credit Ltd
39. Southern Credit Banking Corp. Ltd
40. Stanbic Bank Kenya Ltd
41. Standard Chartered Bank (K) Ltd
42. Trans-National Bank Ltd
43. Victoria Commercial Bank Ltd

APPENDIX II

Cover Letter

University of Nairobi

School of Business

Department of Business Administration

Master of Business Administration Program

Dear sir/madam

REF: MBA Research project

I am a student at the University of Nairobi pursuing a master's degree in Business Administration. I am currently carrying out research on challenges of implementing mobile banking systems in Kenyan commercial banks as part of academic requirements.

I would be grateful, if you could spare sometime from your busy schedule and fill the attached questionnaire.

The information you provide will be treated with utmost confidentiality and will be used solely for the research project; however the findings of this study can be availed to you upon request on completion of this research.

In case you have any queries or need clarification on any of the questions please do not hesitate to contact me on 0733-985310.

Thank you very much for taking your time to fill out this questionnaire.

Yours Faithfully

Boaz Juma

APPENDICES III

QUESTIONNAIRE

Kindly answer all the questions as directed.

SECTION A: General particulars *Tick where applicable*

1. Gender
   a) Male [ ]
   b) Female [ ]

2. Age group
   a) 18-30 [ ]
   b) 31-44 [ ]
   c) 45-55 [ ]
   d) Above 55 [ ]

3. Work position
   a) Line manager [ ]
   b) Middle level manager [ ]
   c) Senior level manager [ ]

4. Academic qualification
   a) Diploma [ ]
   b) Graduate [ ]
   c) Post graduate [ ]
   d) Others specify? _____

5. Professional qualification [_____]

7. Describe the ownership of your bank?
   a) Public [ ]
   b) Private [ ]
   c) Both [ ]

8. What is your clientele base?

a) Less than100,000 [ ]

b) Between 100,000 - 499,999 [ ]

c) Between 500,000-999,999 [ ]

d) Over one million [ ]

SECTION C

Survey questions (tick where applicable)

9. Does your bank offer mobile-banking services?

a) Yes [ ]

b) No [ ]

10. If no please give reasons_____

11. If yes for how long has it been offering the mobile services?

a) Less than 1 year [ ]

b) Between 1-5 years [ ]

c) More than five years [ ]

12. Give an approximate number of your mobile banking clientele base

a) Less than 50,000 [ ]

b) Between 50,000 – 100,000 [ ]

c) Between 100,000-200,000 [ ]

d) Over 200,000 [ ]

13. The following are some issues relating to challenges in the implementation of mobile banking systems, rate them in a scale of 1-5, where **1** represent strongly Agree, **2** Agree, **3** Indifferent, **4** Disagree, **5** Strongly disagree.

	1	2	3	4	5
Determinant of the challenges in implementing mobile banking systems	**Strongly Agree**	**Agree**	**Indifferent**	**Disagree**	**Strongly Disagree**
Workers do not fully support the implementation of mobile banking					
Management do not fully support the implementation mobile banking					
Workers are not fully involved in the implementation of mobile banking systems					
Management are not fully involved in the implementation of mobile banking systems					
This bank lacks the financial resources necessary to implement mobile banking					
This bank lacks the technical resources necessary to implement mobile banking					
The staffs don't have the skill required to implement mobile banking					
Mobile banking system is not compatible with other banking systems					
Mobile banking systems are not safe clients and the bank can lose money to fraudster					
Mobile banking application software frequently changes requiring that customers always update their software					
Employees have negative attitudes towards change					
This organization lack proper change management strategy					
Proper communication systems that inform people and staff about the need					

change are lacking					
Senior management commitment to development of new systems is lacking					
Poor ICT infrastructure prevent the growth of mobile banking					
Mobile banking is less secure					
I perceive risk in mobile banking					
People distrust the mobile banking technology					
Mobile banking systems are not reliable					
The bank does not provide customer protection against loss of money					
It is difficult to win customer confidence to use mobile banking					
The bank does not accept liability incase of loss					
There are no clear laws governing mobile banking					
Banks jurisdiction is not defined in mobile banking					
Mobile banking services are not regulated					
Cost of mobile banking services is prohibitive					
Interoperability (does it work with other systems)					
Regulatory barriers affect it is successful implementation					
Employees resistance to adopt the systems prevent it's successful implementation					

Security fears (there are no proper controls in mobile banking systems)					
Mobile banking service are not tailor made to meet individual's unique needs					
Mobile banking require new and expensive equipment					
Immature markets, the market is still not yet viable					
Lack of skilled personnel with the knowledge in mobile banking operations					
Hand held mobile banking devices such as mobile phones are small with limited capabilities					
Fear of fraud and loss of investment prevent successful implementation					
There is no proper risk management when implementing mobile banking					
High uncertainty over customer adoption of mobile banking services					
It appeals mostly to the young					
Illiteracy is a barrier to mobile banking					
The old have problems using mobile banking technology					

a) Besides the challenges mentioned above list if any other challenges that you encounter when implementing M-banking services.

_____

b) What other customer issues do you encounter when implementing mobile banking?

_____

_____

Thank you.