

ICT USE AND DEVELOPMENT OF BANKING OPERATIONS

IN SELECTED BANKS OF RWANDA

A Thesis

Presented to the School of

Postgraduate Studies and Research

Kampala International University

Kampala, Uganda

In Partial Fulfillment of the Requirements for the Degree

Master of Business Administration (Management)

PREPARED

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DECLARATION A

"This thesis is my original work and has not been presented for a degree or any other academic award of any university or institution of learning'.

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DECLARATION B

"I conform that the work reported in this thesis was carried out by the candidate under my supervisor."

Name and signature of supervisor

Name and Signature of
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Date

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APPROVAL SHEET

This thesis entitled” **ICT AGE AND DEVELOPMENT OF BANKING OPERATIONS IN
SELECTED BANKS OF RWANDA** in partial fulfilment of the requirements for the degree of
master of business administration has been examined and approved by the panel oral
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Grade: _____

Name and Sig of Director, SPGSR

Name and Sig of DVC, SPGSR

Dedication

This effort is dedicated to the Almighty God and my beloved wife Mukamurenzi Charlotte who have grown me up and who always advise me to put effort in education, because it is the key factor of our life.

Acknowledgements

First of all let me thank GOD for the gift of life he has given me and for his guidance and protection throughout this research.

I would like to sincerely thank my supervisor Ms Nakate Sylvia for her generosity of time, constant advice and good ideas regarding the development of the thesis for master's level. Without her constant guidance and encouragement this thesis would not have been successful, I give her thanks.

I would also like to thank lectures at the school of Post Graduate studies for their academic support they have given and share with me.

I would like to thank the management of Kampala international University to all the support and encouragement during my studies.

I would also like to thank my dear wife for his physical and emotional support given to me during this research.

I must appreciate my friends whom have helped and rendered moral support to me.

I would like to thank the Viva Voce panel members of this thesis Dr Manuel Sumil, Dr Jones Orumwense, Dr Yahaya Ibrahim for their support and corrections they have given and shared with me.

Finally I must also appreciate Deputy Vice Chancellor, School of Postgraduate studies and Research Novembrieta R. Sumil, Ph. D, for her support and encouragement during my studies.

ABSTRACT

The purpose of the study was to evaluate ICT use and development of banking operations in selected banks of Rwanda. The objectives of the study were to find the profile of respondents in terms of gender, age, education and experience at work, To evaluate the level effectiveness of ICT use in banking operations, Identify ICT products adopted by Banks and degree of their utilisation, To identify benefits and barriers of ICT adoption in banking operations in Rwanda and To determine if there is a significant relationship between ICT usage and development of banking operations based on the findings of the study.

The researcher used descriptive and quantitative design to select a sample of 136 respondents from 142 employees of 7 responding banks out of 10 targeted banks. In this regard, respondents were chosen by purposive sampling method. In addition to questionnaires observation method was used for primary data collection. Data collected through questionnaire were analyzed quantitatively using descriptive statistics and SPSS statistics.

The research finding revealed that there is a high uptake of ICT in Rwanda banks and ICT represents great potential for business process reengineering of Rwanda banks as it has improved banking services, facilitate accurate record, provides for home and office banking services, prompt and fair attention. The adoption of ICT improves the banks' image and leads to a wider, faster and more efficient market.

The researcher concluded that with the development of technology, alternative delivery mechanism such as ATM and others becomes available. Indeed, ICT is an enabler, but without sufficient capabilities of the human workforce to use it efficiently, the costly investments become ineffective,

The researcher recommended that banking industry should support training and skills development among bank staff and customers by arranging training sources or facilitate networks for exchange of best practice so as to implement new ICT innovation in Rwanda banking industry.

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LIST OF ABBREVIATIONS

ATM: Automated Teller Machine

BI: Banking Industry

BK: Bank of Kigali

BO: Banking operations

BPR: Banque populaire du Rwanda

CBR: Commercial bank of Rwanda

FB: FINA Bank

EFTPOS: Electronic Funds Transfer at Point of sale

EDI: Electronic Data Integrity

MICR: Magnetic Ink Character Reader

ICT: Information and communication technology

IT: Information Technology

KIU: Kampala International University

LAN: Local area Network

SPSS: Statistical Package for social Scientist

TOT: Total

W-LAN: wireless LAN

WAN: Wide Area Network

CHAPTER ONE

THE PROBLEM AND ITS SCOPE

Background to the Study

Today's business environment is very dynamic and undergoes rapid changes as a result of technological innovation, increased awareness and demands from customers. Business organizations, especially the banking industry of the 21st century operates in a complex and competitive environment characterized by these changing conditions and highly unpredictable economic climate. Information and Communication Technology (ICT) is at the centre of this global change curve (Shuangtian, 2008).

The application of information and communication technology concepts, techniques, policies and implementation strategies to banking services has become a subject of fundamental importance and concerns to all banks and indeed a prerequisite for local and global competitiveness. ICT directly affects how managers decide, how they plan and what products and services are offered in the banking industry. It has continued to change the way banks and their corporate relationship are organized worldwide and the variety of innovative devices available to enhance the speed and the quality of service delivery (Ackerman, 2008).

Harold and Jeff (1995) as cited by (Milligan, 2004) assert that financial service providers should modify their traditional operating practices to remain viable. They claim that the most significant shortcoming in the banking industry today is a wide spread failure on the part of senior management in banks to grasp the importance of technology and incorporate it into their strategic plans accordingly.

The Rwandan economy that suffered from 1994 Tutsi genocide, started seeing its way of transforming and development after the financial sector went through a period of crisis.

The GDP of Rwanda was estimated at 1331.6 billion RWF (18.5 Billion Euro) in 2005. The contribution of the agriculture sector is 39% of the GDP while the contribution of the industry is close to 19% and the services sector comes at the top with 41%. The per capita income is 250 USD a year in 2005 and the average economic growth rate is 5% in 2005. The level of saving remained very low and the economy was facing a constant deficit of the balance of payments.

In the late of 2005, the Rwandan banking industry underwent significant restructuring. Several indigenous banks were declared insolvent. These included Cooperative banks which were closed. From 2006, several of existing banks went on an accelerated branch expansion either through mergers and acquisition or through new branch openings.

It was estimated (in 2007) that 1,200,000 people (about 12% per cent of the population) held bank accounts in 10 registered commercial banks with 140 branches. The Government of Rwanda (GoR) recognizes that the banking sector and private sector in general, is an essential engine of development, and welcomes foreign investment in policy and in practice (Wikipedia, 2010).

The banking sector is comprised of commercial banks, one primary microfinance bank, one discount house, one development bank and one mortgage bank. Commercial banks represent 76% of the economy's total financing while micro finance institutions serve 88% of depositors and 90% of borrowers.

The 3 largest local banks are: Banque de Kigali (BK) (100% govt. owned), Banque Populaire du Rwanda (BPR) (98% private), Banque Commercial du Rwanda (BCR) (80% private). Ecobank, Access Bank and Kenya Commercial Bank (KCB) are among the international banks with a presence in Rwanda.

Thus when the business and commerce tend to be on the electronic modes, banking can never remain isolated. Hence electronic banking (E-banking) implies performing basic banking transaction by customers round the clock globally through Electronic Media (Ackerman, 2008).

Currently electronic banking is becoming immensely popular globally and Rwanda is no exception to it. The declining of internet rates, falling Personal computer prices, broad bandwidth access through cable, accessing the NET through cable TV etc. would definitely encourage the boom in E-banking in Rwanda. With the globalization of business and services, the Rwanda cannot lag behind in niche area of electronic banking. Thus National Bank of Rwanda, Commercial Bank of Rwanda, Bank of Rwanda development, FINA Bank, Banque Populaire du Rwanda, Bank of Kigali, COGEBANK, Kenya Commercial Bank, Urwego bank, banque de l'habitat and Ecobank are the predominant commercial banking institutions, diversified into the above lucrative computer based information technologies as strategy for transformation and development of their operations.

The above cited Commercial banks have been able to introduce new ICT products such as debit cards, cash cards, Automatic Teller Machines (ATMs), electronic funds transfer system including western money transfer, new banking services, and especially packaged accounts to attract savers.

Indeed, the marketing accessibility of financial institutions is extended and increased to remote areas or countries via the new telecommunication technology. Hence, the role of ICT investments becomes more important in the banking industry and the quest for survival, global relevance, maintenance of existing market share and sustainable development has made exploitation of the many advantages of ICT through the use of automated devices imperative in the industry.

Statement of the problem

ICT development in recent year has had a profound on banking industry all over the world. Some of the emergence and development, for instance includes; e-security, e-banking and e-marketing, has been topics of increasing interest in recent years for both academics and practitioners, However, the growing of interest in ICT area has been not matched well enough with relevant studies that would give insight into the processes and behaviours in Rwanda, this has triggered this study; how the increasing use of ICT can improve and foster new business models which will be useful for business processes in the Banking Industry in Rwanda.

Purpose of the study

The purpose of the study was to evaluate ICT use and development of banking operations in selected banks of Rwanda

Research objectives

The General objective of the study is the effectiveness of ICT use in development of banking operations in selected banks of Rwanda

The specific objectives are:

1. To find the profile of respondents in terms of gender, age, education and experience at work
2. To establish the level of effectiveness of ICT use in banking operations in Rwanda
3. To determine the degree of development of banking operations in selected banks of Rwanda.
4. To determine if there is a significant relationship between ICT use and development of banking operations based on the findings of the study

Research questions

Looking at the research problem and objectives, the study intends to answer the following questions:

1. What is the profile of respondents in terms of gender, age, education, position and experience at work?
2. What is the current state-of-play concerning ICT usage in banking operations?
3. What are ICT products adopted by banks and degree of their utilisation in Rwanda?
4. What are potential benefits and challenges of ICT adoption on banking operations in Rwanda?
5. Is there any relationship between ICT use and development of banking operations ?

Null Hypothesis (Ho)

There is no significant relationship between ICT use and development of banking operations

The Scope of the Study

Content scope

The study focused on the usage of Information and Communication technology in banking operations in Rwanda. The relation between ICT use and development on banking operations was the area of interest for this study.

Time scope

The study was conducted in Rwanda for a period of 5 months (January to May 2011), targeting all 10 registered commercial banks in Rwanda.

Geographical scope

The research study was carried out in the registered commercial banks in Rwanda as in the beginning of 2011 includes: Commercial Bank of Rwanda, Bank of Rwanda development, FINA Bank, Banque Populaire du Rwanda, Bank of Kigali, COGEBANK, Kenya Commercial Bank, Urwego bank, Housing bank of Rwanda and Ecobank.

Studied commercial banks are located in Kigali the capital of Rwanda (in Gasabo district and Nyarugenge district) and in southern province of Rwanda (Nyamagabe district, Muhanga district and Huye district).

Significance of the study

The beneficiaries of this study are:

Bank

The results of this study will inform banks about opportunities and barriers to overcome and new innovations to take advantages of in order to expand and compete internationally.

Policy Makers

The data collected can be of help to policy makers presently engaged in using appropriate strategies to transform and develop their organization's operations to compete favourably in information oriented market area.

Government

Government of Rwanda through national bank will be informed on ways to monitor e-banking operations.

Academics

The study results are helpful to other researchers intending to carry out more studies in the field of IT, ICT in banking sector. This ideal in encouraging the future researchers aimed at improving and reducing fear of information and communication technology investments in developing countries.

Public

The study results are helpful to the public to embrace and appreciate the use of ICT. This because the whole world is undergoing revolution to the era of technology.

Operational Definitions of Key Terms

Information and Communication Technology (ICT) is the automation of processes, controls, and information production using computers, telecommunications, software and ancillary equipment such as automated teller machine and debit cards.

Banking operations: The legal transactions executed by a bank in its daily business, such as mortgages, providing loans and investments, depending on the focus and size of the bank

Level of effectiveness: The degree to which objectives are achieved and the extent to which targeted problems are solved without reference to costs.

Degree of development: The degree to which something grows or becomes better.

Internet is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer

Intranet is a computer network that uses Internet Protocol technology to securely share any part of an organization's information or network operating system within that organization.

Electronic mail is a system of world-wide electronic communication in which a computer user can compose a message at one terminal that can be regenerated at the recipient's terminal when the recipient logs in.

Network: A system of interrelated building, offices, stations,... over a large area or throughout a country, territory, region, etc .

Server: That which is used in serving

Broadband: Electronics of pertaining to or responsive to a continuous, wide range of frequencies

Software: Any of the written programs, flow charts, etc. including general subroutines, that may be inserted in computer programs.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

In order to ensure the same understanding of terms and concepts that were used in this study report, it is important to point out what other researchers have written about the field of this study. Thus, this chapter is composed of Concepts, Opinions, Ideas from Authors/Experts, review of related literature on the issues of related to the topic under study. It highlights ICT use in banking operations; ICT products in banking operations; benefits and barriers to ICT adoption in banking industry and ICT application and development of banking operations.

Concepts, Opinions, Ideas from Authors/Experts

Information

Information is data that has been processed through the computer system. Information is processed/analyzed data that informs a recipient about a situation. It is the meaning assigned to data within some context for use of that data (Walters, 1992).

Information technology

According to Mejabi (2008), Information Technology is a general term that describes any technology that helps to produce, manipulate, store, communicate and/or disseminate information. Microsoft Encarta 2009 defined information technology as the processing of data via computer: the use of technologies from computing, electronics, and telecommunications to process and distribute information in digital and other forms. Information technology combines the technology of computers and communications to provide information processing services throughout the office or around the world.

Information technology is a term which generally covers the harnessing of electronic technology for the information needs of businesses at all levels, Anderson (1990). In addition, Longley and Shain (1992), defines information technology as the acquisition,

processing, storage and dissemination of vocal, pictorial, textual and numerical information by a micro-electronic based combination for computing and telecommunication. While an information system (IS) is a group of formal process that together collects, retrieve, process, store and disseminate information for the purpose of facilitating planning, control, coordination and decision making in organizations. Information technology on the other hand provides the technical solutions identified in the (IS) information system; including the networks, hardware and software Grainger-Smith and Oppenheim (1994). Porter and Miler (1985) conceive of information technology to broadly encompass the information that business creates and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information. In addition to computers, the data recognition equipment, communication technologies, factory automation and other hardware services are involved. Traditionally, telephone, radio and television were referred to as media technology, Hanson and Narula (1990).

Information technology is basically an electronic device and it's based on integrated circuits or silicon chips. Hanson and Narula (1990) further identified two major forms of information technology, namely information technology as Telematics, meaning "Big media" and Ethnotronic, meaning "Small media". Telematics are to be identified with such technologies as computers, telephone, satellites, television, radio, video and those that rely on large scale infrastructures. Ethnotronics includes technologies such as typewriters, audio cassette records, fax machines, paper copies, calculators, digital watches and other more personal types of technologies.

Computer

A computer is a programmable, multi-purpose use machine that accepts (raw facts and figures) and processes or manipulates it into information that we can understand and utilize. It's an electronic data processor and device that accepts processes, stores, and outputs data at high speeds according to programmed instructions, Microsoft Encarta (2009).

Communication:

Communication often called telecommunication allows data and information to be transmitted from one point to another electronically. It is the transfer of idea or information from data processing system to ultimate users. The ultimate purpose of communicating is to inform the receiver.

Information and Communication Technology

In this study, Information and Communication Technology (ICT) is conceptualized to be referring to Information and Communication Technology.

Maichibi (2007) observes that ICT is at the centre of society and economic transformation taking place in superpower developed countries, developing and third world countries. Because the cost of ICT tools continue to fall and increase their capabilities, their applications are becoming important in all sectors of the economy.

The term information is defined as data recorded, classified, organized, related or interpreted within context to convey meaning. Characteristics of quality of information include timeless, accuracy and ease to use.

According to The Encyclopaedia (2000) , technology is a general term that refers to the process by which human beings fashion arrange tools and machines to increase their control and understanding of the material environment. Technology does not only apply to the tools but is accomplished. In other words technology is the application of advanced electronic methods to store, process and disseminate information.

According to Ronald and William (2003), IT is a term that is used to cover abroad spectrum of computing and communication devices. All information technologies have the ability to capture data, process and or correct data, store data and present data and most of them have the ability to communicate with other information technologies.

Theoretical perspectives

This study is guided by Mohd Gazali ABAS theory of Economic Impacts of ICT. He says that the level of ICT usage among small and medium-sized firms is assumed to be represented by the level of ICT investment because more ICT investment is likely to establish the infrastructure for the use of ICT, in particular ICT networks, and to help provide businesses with more productive equipment and software (Mohd, 2005).

Studies suggested that ICT investment has made direct and indirect contributions to the economic growth of many countries in the 1990s. The direct contribution of ICT investment to the economic growth was roughly assessed by measuring ICT investment's share in the total investment of each national economy (Mohd, 2005).

Mohd (2005) contend that financial service providers should modify their traditional operating practices to remain viable in the 1990s and the decades that follow. They claim that the most significant shortcoming in the banking industry today is a wide spread failure on the part of senior management in banks to grasp the importance of technology and incorporate it into their strategic plans accordingly.

MOHD (2000) claimed that only banks that overhaul the whole of their payment and delivery systems and apply ICT to their operations are likely to survive and prosper in the new millennium. He advises banks to re-examine their service and delivery systems in order to properly position them within the framework of the dictates of the dynamism of information and communication technology.

Financial institutions, particularly banks rely heavily on gathering, processing, analyzing, and providing information in order to meet the needs of customers. Banks strive to get the deposits of their customers so in turn, that money can be used to make loans. In order to meet customers' needs, banks started using automated information processing technology during the 1960's. With processing transactions becoming automated, it allowed for employees to focus time on other tasks or projects. Also, it helped employees learn how to use a computer. Technological advances have allowed banks to provide innovative, new

services or improvements in quality and convenience that attract new customers and increase demand (Woherem; 2000).

Development of ICT in banking industry.

The first stage of information technology in banking industry started with an attempt to automate the process of banking services, which was done through mechanization. It was a mere process of simple electro-mechanical devices such as note counters and accounting calculators, to effect speed on basic transactions such as computation and counting of money. Another stage of information technology was in routine data processing especially in information storage and retrieval. During the late 1950s and throughout the 1960s, business data was processed through punched card equipment and massive mainframe computers with far lower capabilities with far lower capabilities than today's microcomputers. The 1970s saw the advent of the primitive user networks as terminals got connected to the massive mainframes as a result of the challenges posed by large volumes of business data. This was the foundation era of information system (IT) management system (MIS) and decision support system (DSS). The 1980s witnessed the fusion of telecommunications and networking technologies for business deployment. Then was the emergence of data processing, office information system (OIS) and personal computers (PC). The 1990s till date, advances technology which transforms the way bank do business and how the emerging global information infrastructure has levered to shape and support potential networking technology to enhance corporate performance and competitiveness (Adebowale , 1990).

ICT use in banking industry

Information and communication technology (ICT) can also be defined as a computer hardware and software used in telecommunication. ICT is the world's fastest growing economic activity; a sector which has turned the globe into an increasingly interconnected network of individuals, firms, schools and governments, communicating and interacting with each other through faster variety of channels and providing economic opportunities transcending borders, languages and cultures. ICT has opened new channels for service delivery in area such as e-banking, e-commerce, education, e-health, information dissemination etc. (Laudon & Laudon, 2001).

Innovation in technology and world-wide revolution in information and communication technology are perceived to be the catalyst of productivity growth. ICT is expected to reduce costs, increase volumes, and facilitate customized products. Technology adoption is a dire necessity for the public sector banks to complete with new generation private sector and foreign banks. It is a compulsion rather than a choice. Retention of existing customer is the primary concern of majority of the banks today. Companies use ICT in their business processes mainly for three purposes to reduce costs, to better serve the customer and to support growth. Understanding one's business processes and having a clear vision of how they could be improved (be it to save costs or to improve service quality) are critical requirements for firms to effectively use ICT.

The increasing competitive pressure on companies, many of which operate in a global economy, has been a strong driver form ICT. Firms are constantly searching for opportunities to cut costs and ICT holds great promise in this respect as it increases the efficiency of a firm's business processes, both internally and between trading partners in the value chain (D'costa, 2006).

In the banking industry, the main purpose for the use of ICT is highly relevant, as companies in the BI use ICT to reduce costs by increasing process efficiency, to serve the customers better by developing new products and services which could meet customer's needs, and enabling growth by increasing market reach, either by acquiring companies with

innovative ICT skills or by using ICT to smoothen mergers and acquisitions (Ackerman, 2008).

Information technology has basically been used under two different avenues in banking. One is communication and connectivity and the other is banking operations reengineering. Information technology enables sophisticated product development, better market infrastructure, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified market. To this regards, technology has changed the contours of three major functions performed by banks, i.e access to liquidity, transformation of assets and monitoring of risks. Further, information technology and the communication networking systems have a crucial bearing on the efficiency of money, capital and foreign exchange markets. For most banks through the world, ICT have become the back bone of financial service delivery and financial networks have shifted from paper-based to the digital mode (Grace, 2004).

Irechukwu (2000) lists some banking services that have been revolutionized through the use of ICT as including account opening, customer account mandate, and transaction processing and recording. Information and Communication Technology has provided self-service facilities (automated customer service machines) from where prospective customers can complete their account opening documents direct online.

It assists customers to validate their account numbers and receive instruction on when and how to receive their chequebooks, credit and debit cards. ICT products in use in the banking industry include Automated Teller Machine, Smart Cards, Telephone Banking, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking.

Mohd (1995) contend that financial service providers should modify their traditional operating practices to remain viable in the 1990s and the decades that follow. They claim that the most significant shortcoming in the banking industry today is a wide spread failure on the part of senior management in banks to grasp the importance of technology and incorporate it into their strategic plans accordingly.

Woherem (2000) claimed that only banks that overhaul the whole of their payment and delivery systems and apply ICT to their operations are likely to survive and prosper in the new millennium. He advises banks to re-examine their service and delivery systems in order to properly position them within the framework of the dictates of the dynamism of information and communication technology.

Financial institutions, particularly banks rely heavily on gathering, processing, analyzing, and providing information in order to meet the needs of customers. Banks strive to get the deposits of their customers so in turn, that money can be used to make loans. In order to meet customers' needs, banks started using automated information processing technology during the 1960's. With processing transactions becoming automated, it allowed for employees to focus time on other tasks or projects. Also, it helped employees learn how to use a computer. Technological advances have allowed banks to provide innovative, new services or improvements in quality and convenience that attract new customers and increase demand (Woherem; 2000).

Today many banks encode their daily work, which allows checks to be digitally scanned. After scanning at the bank, the items are sent to the clearinghouse before sent to the Federal Reserve Bank. Individuals have started to use electronic banking, which allows a customer to check their balances and process bill payments via a secure Internet connection and a computer, and is available twenty four hours a day. It is fast, convenient, and is easier than going to the bank to get funds. With electronic banking, there are other functions in IT that have evolved such as: Automated Teller Machine, Direct Deposit, and Electronic Bill Payment, Advancements in Information Technology and Banking have been important to the industry and businesses (Woherem; 2000).

ICT infrastructure

Internet access

An important indicator of the general uptake of ICT in the banking industry relates to the use and availability of internet. Internet access is a precondition for e-business, as this is the

main channel for e-banking. The general availability of internet allows for the analysis of overall ICT-readiness in the BI (Fasan, 2008). However, the different broadband connections used to access the internet are not only used as the basis for advanced e-business applications, but also to support internal and external collaboration and to provide customer services over the internet (European commission, DG Enterprise and Industry, 2008).

Use of networks

The application of networks is a vital part of an effective ICT-enabled system, which is especially true in the case of banks with a branch network. Local area Network (LAN) may also be seen as a basic indicator of the minimum infrastructure required to enable companies to conduct e-banking at a substantial level (Shuangtian, 2008).

In his view, (Fasan, 2008) asserts that Wireless LAN is a relatively new technology in the banking industry (BI), and one of its use is to permit bank employees to access network resources from nearly any convenient location. Relatedly, the fact that LAN is a relatively low-tech and easily attainable ICT solution, would to some extent explain the wide coverage of this technology. The BI is often compared to the telecommunication sector in terms of ICT use, which makes this difference in use of W-LAN interesting. However, the reason for the lower use of wireless LAN in the BI may be related to data security concerns (Ackerman, 2008). Indeed, security is an important topic in the BI, as the continuing digitalization of information means that bank processes are increasingly becoming independent on reliable ICT operations. The application of wireless LAN may hence be limited by concerns about the secure application of this technology.

Whereas, Hannan, Rahman&Uddin, (2007) define intranet as a private network that uses internet protocols and network connectivity to securely share part of a bank' information or operations with its employees, (D'Costa, 2006) views extranet as a system by which banks can provide internet/intranet access to customers and suppliers. Indeed, intranet is among other things used by banks to facilitate collaboration across functions or to advance productivity and efficiency by supporting business operations and decisions across the inter-networked enterprise. Extranet on the other hand are not as commonly used as Intranets,

instead, they are considered as a safer way of conducting e-banking services compared to communicating over the internet, as it is closed data network between a bank and its customers (D'Costa,2006).

ICT security measures

The security issue is of special concern in the banking operations, as banking is highly based on trust from its customers. Hence, the risk of hackers, denial of services attacks, technological failure, breach of privacy of customer information, and opportunities for fraud created by the anonymity of the parties to electronic transactions all have to be managed (Hannan, Rahman, & Uddin,2007). In a related insight, (D'Costa, 2006) asserts that depending upon its nature and scope, a breach in security can seriously damage public confidence in the stability of financial institution or of a nation's entire banking system. Therefore, by introducing the appropriate security measures and putting security concerns at ease, the BI might be able to attract the segments among consumers who previously were not inclined to use e-banking. In the researcher's view, it is in the bank's own interest to improve security, as digital fraud can be costly both in financial losses, and terms of damage it does to the brand of the bank.

New ICT products in the banking operations

ICT products in use in the banking industry include Automated Teller Machine, Smart Cards, Telephone Banking, MICR, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking (Laudon and Laudon; 2001).

Several authors have conducted investigation on the impact of ICT on the banking sector of the Nigeria economy. Agboola et al (2002) discussed the dimensions in which automation in the banking industry manifest in Nigeria. They include:

- (i) Bankers Automated Clearing Services: This involves the use of Magnetic Ink Character Reader (MICR) for cheque processing. It is capable of encoding, reading and sorting cheques.
- (ii) Automated Payment Systems: Devices used here include Automatic Teller Machine (ATM), Plastic Cards and Electronic Funds Transfer.

Automatic Teller Machine (ATM)

The next stage was the offering of direct services with the invention of the ATM (Automatic Teller Machine). Automatic teller machines are familiar to most bank customers. They insert a card in the wall, type in a PIN number and, withdraw or deposit their money. They are connected to the bank via telephone lines and pass the details of each transaction to a transaction file. This is updated at the end of the day to debit the customers' bank account with the appropriate sums of money. The ATM allows the customer to get cash out, find out the balance in their account, and change their personal Identification Number (PIN) and request for a statement (Stamoulis, 2000).

Electronic Funds Transfer at the point of sale (EFTPOS)

The next step in direct customer services was the payment for goods or services by debit and credit cards through the EFTPOS (Electronic Funds Transfer at the point of sale) system. How the EFTPOS system works

- The amount due is entered by the retailer into THE EFTPOS terminal (basically a computerized till).
- The customer checks the amount due then:

The magnetic strip on the customer's card is swiped through a card reader so their account details can be read. The customer signs a receipt to prove their identity or (using the chip and PIN system)

Smartcard technology

The latest step is the development of smartcard technology so that fund can be transferred at ATM or EFTPOS terminals from a customer's bank account directly onto the smartcard ROM chip (Hannan, Rahman, &Uddin, 2007). These funds can then be used to purchase good and services from devices not directly connected via the EFTPOS system such as car parking ticket machines etc. The funds are deducted from the smartcard directly but transferred to the retailer's bank account at a later date.

These are cards which have a chip built in. These will soon contain not just the account details of the customer, but also: thumb print and iris pattern. These are unique to the card owner, and will make it much harder for the fraudulent user (Fasan, 2008).

(iii) Automated Delivery Channels: These include interactive television and the Internet.

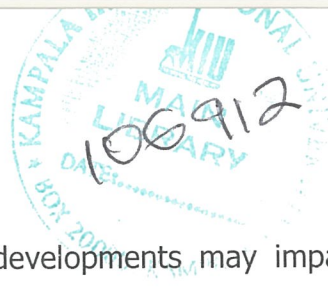
Internet banking

Many customers now use the internet for their banking. They can access their account to get a balance; pay bills; transfer funds; and manage the account. Paying in money is not so easy; cash cannot be stuffed down a phone line. The internet is a playground for hackers and fraudsters. Security on such accounts has to be rigorous (Fasan,2008).

Benefits of ICT Adoption in banking operations

The BI is essentially an information intense industry, and the management in banks may face more demanding times now than in other industries since innovations are regular occurrences in the information age. The study conducted by (European Commission, DG Enterprise and Industry, 2008) shows that European banks, large or small, niche or traditional, have increased their focus on ICT-oriented product and service development in recent years. For instance, the Finnish bank Tapiola Bank, which is primarily an Internet bank, was established as a direct result of the increasing use of ICT among its parent bank's customers. The Internet -only bank Egg was well acquired by Citibank due its ICT-skills which could give Citibank a comparative advantage (European Commission, DG Enterprise and Industry, 2008). In a related insight , (Bagchi &Udo ,2007) argue that if large ICT investments are happening on regular basis , banks must develop a more focused investment-strategy to secure a competitive advantage from their ICT-enabled products and /or processes. This can imply a greater wave of mergers and acquisitions, or a closer cooperation between ICT service companies and banks. If the number of mergers and acquisition increase in the BI, ICT can in this connection actually enable these to be smoother.

In his view ,(Fasan ,2008) contends that banks have created new sources of income by offering more sophisticated products and services which would not have been possible without the use of ICT. In general, there exists a strong normative pressure in the BI for banks to remain up-to-date with ICT developments. The benefits, however, also provide strong for banks to keep up with developments as the expenditures in terms of ICT tend to reap long-term savings.



Jordan &Katz agree with (Fasan ,2008) that ICT-enabled developments may impact the banks in a variety of ways including savings in personnel and time from automated processes ,reduced costs from streamlined and automated process flows , reduced costs from fewer errors , and identification and utilization of economies of scale from lower unit processing costs. Conceptually, (D'Costa, 2006) asserts that the implementation of ICT allows banks to achieve four main objectives. First of all, banks can expect to reduce costs, especially in the area of labour expenditures. Indeed, there is a shift from labour intensive to capital intensive investments. This is supported by the results of the study conducted by (European Commission ,DG Enterprise and Industry ,2008) which indicate that productivity growth in most European countries could be related to a decrease in the number of employees in the BI as well as decreasing working hours per employee. Hence, ICT capital investments are largely substituting labour, particularly in retail banking, which is done by standardizing ordinary financial services and having customers perform basic financial services online, thus rendering the tellers superfluous.

It is also expected in the coming years that the standardization and harmonization will continue, thus contributing to decreasing employment and increased investments in ICT.

Another interesting aspect from the study is that high skilled financial analysts face increasing employment opportunities, which indicates that while the basic financial services are increasingly standardized and performed online by the customers, there is an increased demand for more complicated financial services which can bring value-added to the bank along with the ICT-investments (European Commission, DG Enterprise and Industry, 2008).

Secondly ,(Bagchi& Udo ,2007 ,p. 6) observes that ICT allows for tailor-made services with high added value , such as e-banking combined with the option of face-to-face advisory meetings to a level that satisfies the customers . Third, it allows banks to meet customers' needs faster and leads to a better flow of information and communication. Lastly, ICT enlarges the portfolio of financial products and services that can be offered, which again can lead to higher customer satisfactory (Shuangtian, 2008).

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Barriers to ICT use in banking operations

The introduction of ICT to increase efficiency may also encounter certain barriers agreed by (Beekhuyzen, Ellens, & Siedle, 2005) together with (Ackerman, 2008). The first barrier as mentioned by (Ackerman, 2008) is that ICT implementation and exploitation often requires substantial investments. This can especially be burdensome for smaller banks which do not have financial opportunity to invest as heavily as larger banks. ICT is in Banks increasingly replacing personnel as the largest expenditure. The explanation to this is twofold: According to (Sudhindra, 2005) old systems are increasingly outdated, as over 80% of ICT expenditure goes into maintenance of these systems. This means that new investment is required, and these are challenging projects. The second explanation is that traditional brick and mortar banks are increasingly investing in ICT in order to gain or maintain a competitive advantage (Beekhuyzen, Hellens, & Siedle, 2005). In Europe, (Europe commission, DG enterprise and Industry, 2008) observes that the banking industry is very prudent regarding new investments. This may partly reflect caution due to overinvestment in the past), or that there are not enough incentives such as competition.

Another barrier to implementing of ICT for the efficiency gains is the common fear among employees that, ICT is primarily introduced to save personnel cost and to limit errors (Ackerman, 2008). The impact of internal resistance against innovation is especially strong for lower qualified employees, such as tellers in the case of the banking industry. The fear may be justified, as the human factor is increasingly being removed and the future role of the teller in a modern bank is questionable. In addition, (Sudhindra, 2005) notes that e-banking increases banks' dependence on ICT, thereby increasing the technical complexity of many operational and security issues and furthering a trend towards partnerships, alliances and outsourcing arrangements with third parties. On the positive side, (Shuangtian, 2008) contends that ICT-capital contribute positively to overall output growth. This means that Banks can expect to reap productivity growth by investing in ICT, which could very well exceed the costs associated with the investment.

Customer data is another important aspect when discussing barriers to ICT development in the banking industry. (Nsouli&Schaechter, 2002) realizes that there are still relatively large amounts of offline bank customer (Customers that have not yet used e-banking) that refrain from using online banking services as they do not perceive online banking to be safe. However, It is highlighted by (Shuangtian, 2008) that online banking users in general confident of online security offline customers doubt the safety of online banking. This means that offline customer's resistance towards e-banking is not based on bad experiences, but rather on a general perception that e-banking is risky. This reluctance by especially offline customers has been felt by the Swedish supermarket bank ICA Banken, which is primarily an online bank as observed by (European commission, DG Enterprise and industry, 2008). Despite competitive interest rates as the report says, the Bank had difficulties attracting customers. These differences were partly attributed to the online concept, as the customers preferred the larger and safer.

ICT application and development in banking operations

Sudhindra, (2005) asserts that banking operations development depend on the ICT infrastructure in place include internet, internal networks ,security measures; Nature of innovative technologies adopted by banks (,Automated Teller Machine, Smart Cards, Telephone Banking, MICR, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking); the benefits of ICT adoption including cost reduction, value addition, meet customer's needs faster and leads to a better flow of information and communication, improvement in services and the barriers encountered including substantial investment, lack of skilled labor and then the impact that ICT has on banking activities such as innovation, productivity, capital investment and total factors productivity growth among others.

According to Laudon and Laudon, (1991); the adoption of ICT in banks has improved customer services, facilitated accurate records, provides for Home and Office Banking services, ensures convenient business hour, prompt and fair attention, and enhances faster services. The adoption of ICT improves the banks' image and leads to a wider, faster and

more efficient market. It has also made work easier and more interesting, improves the competitive edge of banks, improves relationship with customers and assists in solving basic operational and planning problems. (Laudon and Laudon ; 1991)

Some authors have conducted investigation on the impact of ICT on the banking sector of the Nigeria economy. Agboola et al (2002) discussed the dimensions in which automation in the banking industry manifest in Nigeria. They include: Bankers Automated Clearing Services: This involves the use of Magnetic Ink Character Reader (MICR) for cheque processing. It is capable of encoding, reading and sorting cheques. Automated Payment Systems: Devices used here include Automatic Teller Machine (ATM), Plastic Cards and Electronic Funds Transfer (Agboola et al; 2002).

The application of information and communication technology concepts, techniques, policies and implementation strategies to banking services has become a subject of fundamental importance and concerns to all banks and indeed a prerequisite for local and global competitiveness. ICT directly affects how managers decide, how they plan and what products and services are offered in the banking industry. It has continued to change the way banks and their corporate relationships are organized worldwide and the variety of innovative devices available to enhance the speed and quality of service delivery (Agboola et al; 2002).

Increased efficiency, productivity and innovation

(D'Costa, 2006) ascertains that investments in ICT result in ICT result in increased efficiency caused by digitalization of transactions previously carried out by tellers, making many routine jobs in the organization redundant. Personnel are in most cases being retrained to perform more financially advanced tasks. Nevertheless, this could in the long run lead to reduced demand for banking personnel as the teller are gradually becoming superfluous, thus leading to a decrease in workforce in the BI. The increasing focus on ICT as a driver for efficiency has meant that more and more banks understand the importance of investments in ICT. ICT

outsourcing is thus a way for smaller banks to take advantage of ICT-enabled process efficiency gains (Jih, Wong, & Chang, 2005).

In the introduction of ICT in the European BI has had a significant impact on banks operating with physical branches. A new distribution channel, the internet, and mobile terminals along with ATM and payment card networks, have made it possible to reduce the amount of bank branches and achieve savings in operating costs (European Commission, DG Enterprise and Industry, 2008).

Likewise, (D'Costa, 2006) ascertains that ICT has productivity increasing effects in both the user sectors and in the ICT producing sectors. In particular, ICT was found to have positive effects on labour productivity and total factor productivity (Pilat, 2005) as cited by (European Commission, DG Enterprise and Industry, 2008). However, ICT-induced productivity effects vary significantly between sectors and among countries.

Another important factor that may influence on the extent to which ICT enables productivity growth is the accompaniment between ICT capital and skills. A large body of literature on the skill-bias of innovation supports the findings that technical change is biased towards skilled workers, reducing demand for unskilled labour, while increasing wage inequality and polarization (Ackerman, 2008). Indeed, the key drivers to industry growth come from ICT capital investments plus labour quality change.

A technological change such as the massive diffusion of ICT represents an interesting case for an analysis with respect to firm's innovation strategies. For example, it is said that industry Leaders often reject important inventions and fail to bring them to the market (Arend, 1999, Christensen, 1997) as cited by (European Commission, DG Enterprise and Industry, 2008, p.5). Entrepreneurial companies are more likely to exploit these opportunities. Entrants frequently introduce products or production processes based on new technology, which can challenge incumbents or even drive them out of the market. Innovations enabled by ICT change the cost structure of companies. Hence, these innovations thereby have a significant impact on the market structure in which these companies operate.

Competition

Banking institutions are countering their competitors by leveraging e-commerce technologies and various service offerings online (Morath, 2000) as cited by (Hann, Rahman, & Uddin, 2007). This is a major shift from the early days of Electronics Funds Transfer (EFT), when large organisations introduced electronic banking to simplify the management of their salary and payroll problems. (Stamoulis, 2000) observes that the internet is increasingly considered as a strategic weapon by banks, which are leveraging it as a distribution channel to offer complex products at the same quality they can provide from their physical branches, at a lower cost, to more potential customers, without boundaries. E-banking is used to augment their current value chain, offering new product and compete for the customers.

At present, the entry barrier to internet banking appears to be much higher for new entrants than was the case during the early days of this type of banking. The barriers stem from customer attitudes and the very nature of banking services and products. The traditional banks with a strong customer base have a competitive advantage over new comers. Foster et al (1999) as cited by (Hannan, Rahman,&Uddin, 2007) have also observed that competitors can move from any industry to disintermediate banks (i.e. eliminate banks as the interface between customers and suppliers). Products differentiation is very difficult for banks, since most of the products sold in retail banking are constrained by legal or industry regulations and, in any case, are readily imitated.

Related studies

Nafuna (2002) in her study of the impact of Internet Service Providers (ISP) on electronic information provision, found that ignorance of users in operating the internet facilities, like modems and satellite dishes, had greatly hampered improvement of services by ISP; in the same light, the study revealed that the use of staff who were not properly skilled in dealing with user problems caused delays in operations.

Mwanja (2001), in his study of computer utilization in government ministries in Uganda, found less emphasis on staff training as principal inhibitors of effective use of computers. Similarly, Wakanyasi (2002), in his study of the role of the ICT, established lack of ICT training as a major impediment to ICT adoption.

Bustain (1986), in his study of the Productivity, established that there is a relationship between the ICT and productivity (Solow's paradox), in that now enterprises with good ICT strategies perform better than those without good ICT strategies.

Money transfer locally and internationally are made possible by information technology. Money gram and Western Union money are run internationally. Odubango (2002) identified the Western Union Money Transfer as a common information technology protected that has clotted the Nigeria banking landscape and has enjoyed a level of co-operation among Nigeria banks. A significant advantage of this is that it has proved as a veritable source of foreign exchange for banking system.

The more recent ones include perception of The Impact of Information Technology Investment in Organizations: A Survey of Hospital Industry by Bruce & Gede, 2000, Understanding Senior executives, the use of information technology and the internet and 27 Workplace redesign, Pjipers G.M (2002) and consequence of the e-organisation (Olujide & Mejabi, 2005).

Information and Communication Technology (ICT) is at the centre of this global change curve and managers cannot ignore Information Systems because they play a critical role in contemporary organization(Laudon and Laudon, 1991).

CHAPTER III

RESEARCH METHODOLOGY

Introduction

In this chapter, the researcher intended to explain methods and techniques used while gathering, presenting, analyzing and interpreting data. It contains sections which are the research design, the research population, sample and sampling procedures, instruments for data collection, procedure for data gathering and analysis.

Research Design

This research was based on descriptive design. This because descriptive survey designs are used in preliminary and exploratory studies which enable researchers to gather information, summarize, present and interpret them for the purpose of clarification.

Research population

The population of research refers to the entire group of people considered as the subject of the research. The population of the study consists of 142 respondents from all participative commercial banks operating in Rwanda as at the end of 2010. There are ten registered commercial banks and are targeted, but 7 banks participated out of all including Commercial Bank of Rwanda (BCR), FINA Bank, Banque Populaire du Rwanda (BPR), Bank of Kigali (BK), Compagnie generale de bank (COGEBANK), Access bank of Rwanda and Ecobank.

Table1: Banks operating in Rwanda and their employees

N°	Bank	Number of Branches Across the country	Employees
1	Bank of Kigali	33	<i>370</i>
2	Commercial bank of Rwanda	13	<i>117</i>
3	Banque Populaire du Rwanda	18	<i>161</i>
4	Ecobank	27	<i>243</i>
5	FINA Bank	10	<i>84</i>
6	Kenya Commercial Bank(Rwanda)	9	220
7	Urwego opportunity	7	225
8	Compagnie Generale de Bank	14	200
9	Access bank Rwanda	7	<i>72</i>
10	Housing Bank of Rwanda	2	21
Tot		140	1713

National bank of Rwanda (2010); the role of banks in Economy of Rwanda.

The study was conducted in registered commercial banks headquarters in Kigali capital of Rwanda and in branches of each bank located in Kigali capital of Rwanda (Gasabo district and Nyarugenge district), Nyamagabe and Huye Districts of Southern province. These areas were selected because of two reasons: Firstly the bank's headquarters are located in the city of Kigali, Rwanda's capital and the other full-service branches are located in the provinces. Secondly because of financial and time constraints of the researcher.

Sample size

The sample size of bank employees was determined by using the Solven's formula.

$$n = \frac{N}{1 + (N \times e^2)}$$

n= required sample size (n=105)

N=Population (N=142)

e= Standard error (e=0.05)

$$n = \frac{142}{1 + (142 \times 0.05^2)} = 104.78$$

In this regard, the total of only 7 banks participated in this study and 3 banks did not, the researcher drew a total number of 136 banks employees (respondents) whereby in each bank, respondents were chosen by purposive sampling method. In this type of sampling the researcher uses her/his own judgement or common sense regarding the participant from whom information will be collected.

Table2: Sample size of Targeted banks and respondents

N°	Bank	Branches	Number of employees(population)	Selected bank employees(respondents)	District of study
1	Bank of Kigali	3	25	24	Huye District Nyamagabe District Nyarugenge(Kigali)
2	Commercial bank of Rwanda	2	18	17	Huye(south province) Nyarugenge(Kigali)
3	Banque Populaire du Rwanda	3	27	26	-Nyarugenge Town -Gasabo and Huye districts
4	Ecobank	3	24	23	-Nyamagabe and Huye Districts(south province) - Nyarugenge(Kigali)
5	FINA Bank	2	16	15	Gasabo District Nyarugenge Town
6	Compagnie Generale de Bank	3	21	20	Nyamagabe and Huye Districts(south) Nyarugenge(Kigali)
7	Access bank Rwanda	1	11	11	Gasabo
TOTAL		17	142	136	

Sampling procedure

A sample of 136 respondents was selected through purposive sampling. The 136 banks employees and selected have, by nature of their work, information on the adoption of ICT devices in bank operations. The researcher chooses this technique because; the aim will be to select a representative sample that will be information-rich and those who will have a higher need for information in the performance of their work.

The researcher employed the multiple methods in the process of gathering both quantitative and secondary data. The researcher employed observation method, interview method and content analysis method.

Research Instrument

Questionnaire, interview guide and observations checklist were respectively applied for this investigation. Primary data was collected from the selected population with the use of questionnaires and interview guide.

The questionnaire comprised two sections: The first includes personal profile of respondents and the second assesses ICT use in banking operations and other major factors that affect development of banking operations.

Information about development of banking operations was from the secondary sources, where by the researcher used observation of checklist to observe and analyze the state of banking industry in Rwanda from National bank of Rwanda.

Validity and Reliability of the instrument

The content method was used. To investigate the validity of all the questionnaires four bank employees knowledgeable about the theme of the study were asked to judge item in each questionnaire either relevant (R) or irrelevant (IR). There after the Content Validity Index was computed for each instrument as shown in appendix 3.

Table 3: Content Validity Index for bank employees

Questionnaire	Content validity index(CVI)
bank employees questionnaire	0.78

The table3 indicates that CIVs were considerably greater than 0.7. This implies that the questions were valid and therefore ready for data collection.

The liability of both banks employees' instrument was established through a test-retest method. The researcher conducted a pre-test for the two sets of questionnaires in Ecobank. A pre-test was conducted again after two weeks to the same respondents in the same bank and it gave the same results, showing that questionnaires had consistency in reliability.

Data gathering procedures

Collection of data for this study was done after a sequence of the following steps: an introduction letter from the Kampala International University to the local government of Nyarugenge (Kigali), Gasabo (Kigali), Huye (southern province) and Nyamagabe (Southern province) districts and then researcher visited managers of selected banks;

Primary data was collected with the use of interview guide; questionnaire was administered to the selected bank employees. The questionnaire for both bank employees was composed in English only since most banks employees in Rwanda speak English.

Secondary data was gathered from library, internet, National bank of Rwanda.

During the period of distributing, the questionnaires were distributed to selected banks and then to bank employees. More all questionnaires distributed were not returned because some employees did not participate.

After questionnaires are filled and taken back from employees and the data was analysed.

Data Analysis

The term analysis involves a number of closely related operations, which are performed with the purpose of summarizing the collected data and organizing these in such a manner that they answer the research questions and hypotheses if they exist.

In this study, data collected were of quantitative and qualitative nature and their analysis was done by statistical analysis using descriptive statistics and SPSS's statistics to get percentages and means of data value for questionnaire items.

Ethical consideration

To avoid to the participants in this study, the researcher considered the fact that individuals have right to participate or not. The researcher therefore took into consideration the following:

Gain the consent of the respondent. The researcher informed respondents before taking questionnaire to them and giving time to fill the questionnaire at their convenient time without putting them on pressure.

Due to the high security consciousness of banking industry, the researcher ensured the participants that collected information will remain confidential and will be used only for academic purpose.

Limitation of the study

Finding the appropriate time to fill questionnaire was hard since the staff members to the selected banks had other activities outside office and also during office hours they can be busy with office work. However the researcher has arranged with the staff members of selected banks how and when to fill the questionnaires.

There were instances of some respondents resisting completion of the questionnaires due to fear of conflict of the regulatory authorities but since there were assured of confidentiality the researcher got the necessary information.

The research encountered difficult constrains in collecting data, this is due to the fact that the Banking Institution as organization which deals with finance and valuable documents are highly security conscious, the staffs are seriously prohibited from letting out some confidential information, as a result of these the researcher was made to go through some scrutiny before questionnaires are collected and completed.

CHAPTER FOUR

PRESENTATION OF FINDINGS, ANALYSIS AND INTERPRETATION

Introduction

This chapter presents information gathered using a semi-structured questionnaire which was addressed to Rwanda commercial banks. In total ten banks were targeted and managers of banks were interviewed. In total one hundred and thirty six questionnaires were distributed but only one hundred and Fourteen were filled and returned to the researcher, which implies that a total of 3 banks did not participate in the study, these three banks decline from giving information for security and competition reasons. It means that only 7 banks out of total 10 registered commercial banks in Rwanda participated in the study.

Table 4: Background Information of respondents from 7 banks

POSITION and EDUCATION		AGE AND GENDER												TOT
		21-29 years			30-40 years			Over 40 years			Total respondents			%
		F	M	T	F	M	T	F	M	T	F	M	T	
Education	Certificate	0	0	0	0	0	0	0	0	0	0	0	0	0%
	Diploma	4	4	8	0	6	14	0	0	0	4	10	14	12.3%
	Degree	7	5	12	18	37	55	9	17	26	34	59	93	81.6%
	Master	0	0	0	5	2	7	0	0	0	5	2	7	6.1%
	TOT	11	9	20	23	45	68	9	17	26	43	71	114	100%
	TOT (%)	9.6	7.8	17.5	20.1	39.4	59.6	7.8	14.9	22.8	37.7	62.2	100	
Position	Manager	0	0	0	1	3	4	4	9	13	5	12	17	14.9%
	Accountant	6	1	7	2	3	5	0	0	0	8	4	12	10.5%
	Marketing	3	2	5	0	2	2	2	8	10	5	12	17	14.9%
	ICT	0	2	2	6	23	29	3	0	3	9	25	34	29.8%
	Teller	2	4	6	14	14	28	0	0	0	16	18	34	29.8%
	TOT	11	9	20	23	45	68	9	17	26	43	71	114	100%
	TOT (%)	9.6	7.8	17.5	20.1	39.4	59.6	7.8	14.9	22.8	37.7	62.2	100	

EXPERIENCE		AGE			AND			GENDER						
		21-29 years			30-40 years			Over 40 years			Total respondents			%
EXPERIENCE	Below 1year	F	M	T	F	M	T	F	M	T	F	M	T	
	1-5 years	6	4	10	0	0	0	2	1	3	8	5	13	11.4%
	Above 5 years	1	5	6	5	5	10	3	0	3	9	10	19	16.7%
	TOT	4	0	4	18	40	58	4	16	20	26	56	82	71.9%
	TOT (%)	11	9	20	23	45	68	9	17	26	43	71	114	100%
BANK	BK	9.6	7.8	17.5	20.1	39.4	59.6	7.8	14.9	22.8	37.7	62.2	100	
	CBR	3	2	5	3	7	10	4	5	9	10	14	24	21%
	BPR	2	1	3	2	7	9	0	4	4	4	12	16	14.1%
	ECOBANK	1	2	3	7	7	14	2	5	7	10	14	24	21%
	FINA BANK	2	0	2	5	9	14	1	1	2	8	10	18	15.8%
	COGEBANK	0	1	1	3	2	5	0	2	2	3	5	8	7%
	ACR	2	1	3	2	9	11	2	0	2	6	10	16	14.1%
	TOT	1	2	3	1	4	5	0	0	0	2	6	8	7%
	TOT(%)	11	9	20	23	45	68	9	17	26	43	71	114	

Source: Primary data from the researcher computation, 2011

The above table indicates that majority of the bank employees among selected banks are between 30-40 years with 59.6%; above 40 years with 22.8% and 20-29 there were few bank employees with 17.6%. This implies that most of the selected employees are mature in age and service. It indicates that majority of the respondents were males with 62.2% and females with 37.8%. This implies that most of the employees in selected banks are males.

Majority of employees (81.6 %) were well educated with university degree. Only a small number 12.3% had diploma qualifications and only 6.1% had attained a master’s level of education. The table above shows that majority of selected employees were experienced with 71.9% and less experienced with 11.4% and it shows that the researcher insisted on the employees who have information of ICT usage in daily banking operations. These are Tellers with 29.80%, ICT department with 29.80%, Manager with 14.95%, marketing department with 14, 95% and accountant with 10.50%.

Table 4, shows how employees from selected banks have participated. Bank of Kigali with 21%, Banque Populaire du Rwanda with 21%, Ecobank with 15.8%, Commercial bank of Rwanda with 14.1%, Compagnie Generale de Bank with 14.1% Fina bank and access bank of Rwanda 7% each.

Table 5: Level of ICT use in banking operations

ICT use	Mean	Response made	Rank	Range	Interpretation
The bank has access to the internet	4.00	Strongly agree	1	3-4	Highly appreciated
You use a computer connected to internet at least weekly	3.63	Agree	2	3-4	Highly appreciated
IT systems are dedicated for managing orders or purchases	3.51	Agree	6	3-4	Highly appreciated
IT systems are useful for customer/bank interaction	3.63	Agree	2	3-4	Highly appreciated
The bank has a website or a home page	4.00	Strongly agree	1	3-4	Highly appreciated
Bank uses website to market own product	1.16	Disagree	9	1-2	Not appreciated
Bank provide online financial services to customers via the internet	3.01	Agree	8	3-4	Highly appreciated
Bank provide security facilities in its daily operations	3.63	Agree	2	3-4	Highly appreciated
Bank uses internet for interaction with public authorities	3.51	Agree	6	3-4	Highly appreciated
Average mean	3.34	Agree		3-	Highly appreciated

Source: Primary data from the researcher computation

The level of ICT use in studied banks was measured with 9 qualitative questions in the questionnaire. Each question was Likert scaled between one to four, where 1 is for strongly disagree, 2 for Disagree, 3 for Agree, and 4 for strongly Agree. The respondents were required to rate the level of ICT use in their banks by ticking the relevant number in the box. Their responses were analyzed using SPSS's summary statistics showing the means and interpretation as indicated in table above. Each question and correspondent mean was qualified. Range of between one and two (1-2) was qualified not appreciated, 2-3 was qualified appreciated and 3-4 was qualified highly appreciated. The question on the level of ICT use was qualified highly appreciated (mean=3.34). The findings indicated that majority of studied banks have access to the internet, have a website or a home page, use a computer connected to internet at least weekly, provide security facilities in its daily operations, IT systems are useful for customer/bank interaction and use internet for interaction with public authorities.

Table 6: Degree of utilization of ICT products in banks

UTILIZATION OF ICT PRODUCTS	Mean	Response made	Rank	Range	Interpretation
There has been a positive response among customers towards Spread of ATM	3.61	Agree	1	3-4	High
There has been a positive response among customers towards Spread of Electronic funds transfer	3.46	Agree	4	3-4	High
There has been a positive response among customers towards Smart Cards	3.57	Agree	2	3-4	High
It has been a positive response among customers towards Electronic Home and Office Banking	3.38	Agree	7	3-4	High
There has been a positive response among customers towards Electronic Data Interchange	3.10	Agree	9	3-4	High
There has been a positive response among customers towards Computerized Credit Rating	3.46	Agree	4	3-4	High
There has been a positive response among customers towards Telephone and internet Banking	3.57	Agree	2	3-4	High
There has been a positive response among customers towards MICR cheques	3.46	Agree	4	3-4	High
There has been a positive response among customers towards daily calculation of account program	3.38	Agree	7	3-4	High
Average mean	3.44	Agree		3-4	High

Source: Primary data from the researcher computation, 2011

The degree of utilization of ICT products in studied banks was measured with 9 qualitative questions in the questionnaire. Each question was Likert scaled between one to four (1-4), where 1 is for strongly disagree, 2 for Disagree, 3 for Agree, and 4 for strongly Agree. The bank employees were required to rate the degree of utilization of ICT products in their banks by ticking the relevant number in the box. Their responses were analyzed using SPSS's summary statistics showing the means and interpretation as indicated in table above. Each question and correspondent mean was qualified. Range of between one and two (1-2) was qualified not appreciated, 2-3 was qualified appreciated and 3-4 was qualified highly appreciated. The question on degree of utilization of ICT products in banks was qualified high (mean=3.44). This implied that the ICT products are utilized in most studied banks mainly Electronic Home and Office Banking, Electronic Data Interchange, Computerized Credit Rating, Spread of Electronic funds transfer, Smart Cards and Telephone and internet Banking and there has been a positive response among customers towards these ICT products.

Table 7: Benefits ICT adoption in banking operations

	Mean	Response made	Rank	Interpretation
Adoption of ICT allows banks to meet customers' needs faster	3.14	Agree	8	Highly appreciated
Adoption of ICT facilitates high skilled financial analysis	3.04	Agree	9	Highly appreciated
Adoption of ICT facilitates easily to access money 24/7 hours	3.64	Agree	3	Highly appreciated
Adoption of ICT Enhances Services with high added value	3.46	Agree	4	Highly appreciated
Ability to Access banking services at any location and any time	3.89	Agree	2	Highly appreciated
Adoption of ICT helps the bank handle more customers	3.31	Agree	6	Highly appreciated
Adoption of ICT makes International Market accessible	3.31	Agree	6	Highly appreciated
Adoption of ICT facilitates wide coverage	3.93	Agree	1	Highly appreciated
ICT use in Rwanda banking operations has been a success	3.46	Agree	4	Highly appreciated
Total	3.46	Agree	3-4	Highly appreciated

Source: Primary data from the researcher computation, 2011

Benefits of ICT use in studied banks were measured with 9 qualitative questions in the questionnaire. Each question was Likert scaled between one to four (1-4), where 1 is for strongly disagree, 2 for Disagree, 3 for Agree, and 4 for strongly Agree. The bank employees were required to rate the degree of utilization of ICT products in their banks by ticking the relevant number in the box. Their responses were analyzed using SPSS's summary statistics showing the means and interpretation as indicated in table above. Each question and correspondent mean was qualified. Range of between one and two (1-2) was qualified not appreciated, 2-3 was qualified appreciated and 3-4 was qualified highly appreciated. The

question on benefits of ICT adoption in banking operations was qualified highly appreciated (mean=3.46). This implied that most banks have benefited from usage of ICT mainly to handle more customers, to facilitate high skilled financial analysis to meet customers' needs faster, to access banking services at any location and any time and to be a success.

Table 8: Challenges of ICT adoption in banking operations

	Mean	Response made	Rank	Interpretation
Ignorance among the customers on how to use ICT products	3.36	Agree	2	Highly appreciated
Fear among employees and internal resistance against innovation	3.15	Agree	4	Highly appreciated
Lack of funds/money to facilitate the application and use of ICT in service delivery	3.15	Agree	4	Highly appreciated
Customers do not perceive online banking to be safe	3.24	Agree	3	Highly appreciated
Lack of trust on ATM usage, customer prefer to bank their money face to face on the counter instead of using ICT facilities	3.15	Agree	4	Highly appreciated
Bank has difficulties in recruiting personnel with ICT skills	3.75	Agree	1	Highly appreciated
Total	3.3	Agree		Highly appreciated

Source: Primary data from the researcher computation, 2011

Challenges of ICT were measured with 6 qualitative questions in the questionnaire. Each question was Likert scaled between one to four (1-4), where 1 is for strongly disagree, 2 for Disagree, 3 for Agree, and 4 for strongly Agree. The bank employees were required to rate the challenges of using ICT in their banks by ticking the relevant number in the box. Their responses were analyzed using SPSS's summary statistics showing the means and

interpretation as indicated in table above. . Each question and correspondent mean was qualified. Range of between one and two (1-2) was qualified not appreciated, 2-3 was qualified appreciated and 3-4 was qualified highly appreciated. The question on challenges of ICT in banking operations was qualified highly appreciated (mean=3.3). The findings indicated that there are challenges when using ICT in banking operations mainly a fear among employees and internal resistance against innovation, difficulties in recruiting personnel with ICT skills, Lack of funds/money to facilitate the application and use of ICT in service delivery, Ignorance among the customers on how to use ICT products Customers do not perceive online banking to be safe .

Table 9: Developments in banking operations

banking operations	Mean	Response made	Rank	Interpretation
The bank involves ICT to protect customer data	3.24	Agree	7	highly appreciated
The bank considers customer decisions	3.21	Agree	8	Highly appreciated
The bank involves ICT in planning	3.79	Agree	1	Highly appreciated
The bank involves ICT for proper market segmentation	3.27	Agree	6	Highly appreciated
The bank involves ICT for competitive strength	3.28	Agree	5	Highly appreciated
The bank uses ICT to facilitate accurate records	3.21	Agree	8	Highly appreciated
The bank involves ICT in production process of existing and emergency of new products	3.60	Agree	4	Highly appreciated
ICT assists bank managers to take quality decisions	3.69	Agree	2	Highly appreciated
The bank uses ICT for proper forecasting	3.69	Agree	2	Highly appreciated
Total	3.44	Agree		

Source: Primary data from the researcher computation, 2011

Development in banking operations was measured with 9 qualitative questions in the questionnaire. Each question was Likert scaled between one to four, where 1 is for strongly disagree, 2 for Disagree, 3 for Agree, and 4 for strongly Agree. The bank employees were required to rate the development in banking operations in their banks by ticking the relevant number in the box. Their responses were analyzed using SPSS's summary statistics showing the means and interpretation as indicated in table above. . Each question and correspondent mean was qualified. Range of between one and two (1-2) was qualified not appreciated, 2-3 was qualified appreciated and 3-4 was qualified highly appreciated. The questions on the development in banking operations was qualified highly appreciated (mean=3.44).

The findings indicated that majority of the respondents agreed that bank involve ICT to protect customer data, banks involve ICT for competitive strength, banks use ICT for proper forecasting, ICT assists bank managers to take quality decisions, banks involves ICT for proper market segmentation, The bank involves ICT in production process of existing and emergency of new products, The banks use ICT to facilitate accurate records and bank consider customer decisions. This implied that ICT has developed banking operations in most studied banks.

Table 10: Correlating ICT Use and Developments in banking operations

Variables Correlated	r-value	Sig-value	Interpretation	Decision on Ho
ICT Use Vs Banking Operations	0.746	0.000	Positive and significant	Rejected
ICT Use Vs product utility	0.984	0.000	Positive and significant	Rejected
ICT Use Vs Benefits	0.947	0.000	Positive and significant	Rejected
ICT Use Vs Challenges	0.938	0.000	Positive and significant	Rejected

Source: Primary data from the researcher computation, 2011

The r-value suggest a positive significant relationship between ICT use and banking operations with ($r=0.746$ sig-value $=0.000<0.05$). Thus it leads to a conclusion that ICT use relate to development of banking operations in Rwanda at 0.05 level of significance.

CHAPTER FIVE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter provides discussions of findings, conclusions of the study which are derived from discussions, it also points out some recommendations of the study. Finally highlights area for further research.

The objectives of the study were: To establish the level of effectiveness of ICT use in banking operations in Rwanda, Identify the benefits and challenges of ICT use in banking operations in selected banks of Rwanda, to determine the degree of development of banking operations in selected banks of Rwanda and To determine if there is a significant relationship between ICT use and development of banking operations based on the findings of the study

Findings

Level of effectiveness of ICT use in banking operations

From the results of the study, it was reviewed that ICT use in banking operations was highly effective (table 5). This implies that usage of ICT in banking operations in Rwanda was at high level. This level was measured on the basis of accessibility to the internet, computer connected to internet at least weekly, Usage of ICT systems for customer/bank interaction, Usage of website to market own product, online financial services to customers via the internet, security facilities in daily banking operations, and usage of internet to interact with public authorities. This implied that banks of Rwanda have taken into consideration the use of computer based information technologies and modified their traditional operating practices.

Harold and Jeff, (1995) supports these findings when he says that financial service providers should modify their traditional operating practices to remain viable in the 1990s and the decades that follow. They claim that the most significant shortcoming in the banking industry

today is a wide spread failure on the part of senior management in banks to grasp the importance of technology and incorporate it into their strategic plans accordingly.

Degree of utilization of ICT Products

The study revealed that majority of banks used new ICT products (table 6) .This implies that Rwanda banks have invested in new technologies in their daily operations.

In line with findings of the study in the period of adoption, Electronic Home and Office Banking still ranked least in its spread while Computerized Credit Rating, Electronic Data Interchange EDI, Electronic fund transfer, Smart card, Telephone Banking, ATM, MICR Cheque and daily calculations of account program follow in that order. Low rate of spread of these technologies might be due to cost, fear of fraudulent practices and lack of facilities necessary for their operation. Increase in the rate of adoption and the spread of ICT products, especially the use of cards has reduced the influence of cash on financial transactions.

D'costa, (2006) asserts that there has been a very modest move away from cash. Frazer, (1985) also contends that the advantages of cash diminish as the value of transactions increases. Some payments are now being automated and absolute volumes of paper transactions have declined under the impact of electronic transaction brought about by the application of ICT to the payment system.

Benefits of ICT adoption in banking operations in Rwanda

The findings revealed that most banks benefited from usage of ICT in their operations (table 7). This implied that the majority of banks have benefited from investment in ICT products. These benefits were measured on the way Adoption of ICT helps the bank handle more customers, adoption of ICT allows banks to meet customers' needs faster, ICT use in Rwanda banking operations has been a success, Adoption of ICT facilitates high skilled financial analysis , Adoption of ICT facilitates easily to access money 24/7 hours, Adoption of ICT Enhances Services with high added value, Ability to Access banking services at any

location and any time, Adoption of ICT makes International Market accessible and Adoption of ICT facilitates wide coverage.

The study revealed that quick access to services is the one of most benefits ICT have created in banking operations as respondent said that they access their money 24/7. Additionally, majority of the banks working with ICT as a process efficiency enabler agree that ICT have changed the role of the tellers, as they are no longer performing basic financial services. However, most banks state that they have upgraded the teller's skills so that they are now able to perform more complicated financial services, and this enables the bank to serve a big number of customers at the same time and in different locations thereby improving their services.

Fasan, (2008) supports that banks have created new sources of income by offering more sophisticated products and services which would not have been possible without the use of ICT. In general, there exists a strong normative pressure in the BI for banks to remain up-to-date with ICT developments. The benefits, however, also provide strong for banks to keep up with developments as the expenditures in terms of ICT tend to reap long-term savings.

It was further revealed that ICT has enabled people to bank everywhere rather than travelling every now and then to the domicile agent.

Barriers of ICT adoption in banking operations

The findings revealed that there was a set of barriers to the application of new technologies (table 8). This implies that the implementation of computer based technologies face some barriers. These barriers were measured on the basis of Ignorance among the customers on how to use ICT products, Fear among employees and internal resistance against innovation, Lack of funds/money to facilitate the application and use of ICT in service delivery, Customers do not perceive online banking to be safe, Lack of trust on ATM usage, customer prefer to bank their money face to face on the counter instead of using ICT facilities and Bank has difficulties in recruiting personnel with ICT skills.

The study revealed that capital investment is the major barrier of ICT development in banking industry in Rwanda. Additionally, it was revealed that it is difficult to recruit personnel with ICT and management skills at the same time, especially when the banking system is not familiar.

ICT implementation and exploitation often require substantial investments. Indeed, this can especially be burdensome for smaller banks which do not have the financial opportunity to invest as heavily as larger banks. This is justified by the fact that with technology, applications and systems become quickly obsolete. On the other hand,

As far as recruitment of personnel with IT skills is concerned, the study revealed that about it is difficult to recruit employees with ICT skills. However, some of respondents argued that when a bank has an unfamiliar system, it might be difficult to find personnel with both IT and banking skills. Apart from lack of ICT specialist in Rwanda banking industry, the study revealed that high remuneration for ICT specialist is another problem associated with IT personnel. D'Costa, (2006) supports the argument that banks interested in reaping the efficiency benefits from ICT may, however, find the acquisition and maintenance costs too high. However, after interest expenses (which is largely a variable cost), labor is the biggest expense item for small banks (and is more likely to be a fixed cost).

Ackerman, (2008) supports the findings revealed by this study where he says that ICT development in banking operations is affected by fear among employees and internal resistance against innovation. The fear may be justified, as the human factor is increasingly being removed and the future role of the teller in a modern bank is questionable

Shuangtian, (2008) supports the findings revealed by this study when he says that online banking users in general confident of online security offline customers doubt the safety of online banking. This means that offline customer's resistance towards e-banking is not based on bad experiences, but rather on a general perception that e-banking is risky

The researcher also observed that some of the barriers of ICT development in banking operations in Rwanda include: the customer inexperience on the usage of the ICT facilities

such as lack of trust on ATM usage, some customers prefer to bank their money face to face on the encounter instead of using such facility on the machine, also the expensive nature of internet facilities in Rwanda poses a barrier.

Development of banking operations

The study revealed that there was a positive development of banking operations (table 9). This implies that when banks use ICT in their operations, they can be able to perform effectively. The development of banking operations was measured on bank's involvement of ICT to protect customer data, bank's considerations of customer decisions, bank's involvement of ICT in planning, bank's utilization of ICT for proper market segmentation, bank's usage of ICT for competitive strength, bank's usage of ICT to facilitate accurate records, The bank's involvement of ICT in production process of existing and emergency of new products, assistance of ICT for bank managers to take quality decisions and the bank's usage of ICT for proper forecasting. The findings indicated that the majority of banks which have invested enough in ICT facilities have improved their operations.

Sudhindra, (2005) supports these findings when he says that banking operations development depend on the ICT infrastructure in place include internet, internal networks ,security measures; Nature of innovative technologies adopted by banks (Automated Teller Machine, Smart Cards, Telephone Banking, MICR, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking); the benefits of ICT adoption including cost reduction, value addition, meet customer's needs faster and leads to a better flow of information and communication, improvement in services and the barriers encountered including substantial investment, lack of skilled labor and then the impact that ICT has on banking activities such as innovation, productivity, capital investment and total factors productivity growth among others.

Laudon, and Laudon, (1991) asserts that ICT directly affects how managers decide, how they plan and what products and services are produced.

The findings revealed that the employment perspectives in banking industry in Rwanda showed that overall employment in this industry tend to decline in most banks, especially

since the beginning of the new millennium. With regard to average working hours, ICT investments tend to have diminishing impact on these in the banking operations in Rwanda, although significant differences between banks prevail.

The analysis has confirmed that the diffusion of ICT drives the innovation process in the banking operations. It was realized that ICT enabled innovation process in the banking industry since for a bank to remain competent it has to cope with changing environment.

Fasan, 2008 supports the findings of this study when he asserts that a company's ability to innovate its work process and business routes combined with complementary investment in working practices, human capital, and firm restructuring will it have an impact on performance. The full exploitation of total factor productivity growth is however only found when high and medium skilled labour is combined with organizational innovative strategies and changes.

Findings revealed that tellers are increasingly being retrained to perform financial services in the banks, thus moving the tellers from the low level skill class to the medium level skill class, but not all the way to the high level skill class. However, if the development in ICT continues with more sophisticated systems, even medium skilled labor becomes substitutable by ICT equipment in the long run. However, this development remains yet to be seen.

As far as competition is concerned, it was discovered that competitive pressure force banks to lower their cost. Rwanda banks seek to get economy of scale in bank procession on stead of being a big bank. Banks seek to secure the optimal business structure, and secure the competitive imperative of economy of scale.

Relationship between ICT use and development of banking operations

The study revealed that there was a very positive and significant relationship between ICT and development of banking (table 9). Thus it leads to a conclusion that ICT use relate to development of banking operations in Rwanda at 0.05 level of significance.

Conclusions

This study focuses on Information Communication Technology use in Banking operations. It aimed at describing how banks in Rwanda apply ICT in their operations, identifying benefits and barriers of ICT adoption in Rwanda banking industry; and determine if there is a significant relationship between ICT use and development of banking operations in Rwanda. From discussion of findings, in line with objectives of the study a set of conclusions was drawn.

The Rwanda BI has a high use of computers, and a high application rate of the internet, and many banks apply security measures like firewalls and encryption systems to secure data.

Adoption of ICT has influenced the content and quality of banking operations. From all indications, ICT represents great potential for reengineering of Rwanda Banks. Investment in information and communication technology should form an important component in the overall strategy of banking operators to ensure effective performance. It is imperative for management to intensify investment in ICT products to facilitate speed, convenience, and accurate services or otherwise lose out to their competitors. The banking industry in Rwanda presents ICT providers with great opportunity to market their innovations. Success in this area however depends on how they can customize their services to appeal to the read minds of various stake holders in the industry.

The adoption of ICT in banks has improved customer services, facilitated accurate records, provides for home and office Banking services, ensures convenient business hour, prompt and fair attention, and enhances faster services. The adoption of ICT improves the banks' image and leads to wider, faster and more efficient market. It has also made work easier and more interesting, improves the competitive edge of banks, improves relationship with customers and assists in solving basic operational and planning problem.

The developments in collection, storage, processing, transmission and distribution has influenced all aspects of banking activity and was regarded as the main driving forces for the changes in banking industry.

In conclusion; due to the development of technology, bank's information deteriorated. Entry barrier have been declining, new competitor have emerged. Some financial products and services have become more transparent and communities, customer show willing to unbundled the demand for financial products and services , all these lead to a more competitive market environment. Due to lowered entry and exit and deconstruction, for some sub-financial markets, contestability in banking. Technology has a major impact on the way banking and financial services are delivered. A wide range of alternative delivery mechanism becomes available, Internet, ATM... these reduce the dependence on the branch network as a core delivery mechanism .With the development technology, the financial systems are substantially over- supplied with delivery system through a duplication of network, bank has to change their delivery strategy, rationalize their branch network strategy.

In sum, all of the above-mentioned trends and challenges are ICT-driven and therefore relevant to include when analyzing ICT use in the BI. The increased focus on customer relations management is possible thanks to ICT, and the data protection has been fuelled by increased investment in ICT in order to create systems to support data recovery. Customer confidence is only an issue with respect to online banking. Also, the development of standards is increasingly necessary with increased online banking and thereby increased banking across borders, but also allows for streamlining the information flow, which can give Rwanda Banks a competitive advantage in the long run. Although people lack of awareness about ICT has affected the proper use of ATM machines, also the introduction of ATMs is largely possible due to investments in ICT people prefer to bank their money at the counter instead of use the ATM machine to bank it due to lack of trust. However, the introduction of ICT to the BI also calls for an increased focus on data protection and fighting the misuse of the Banking Industry.

Recommendations

The banking industry need to better apply ICT to improve its operations, such as customer services and products. Banks should also develop, implement and secure IT services.

Banks should train bank staff and customers how to use new ICT products.

Banks should create awareness through advert and educate their customers on the usage of various ICT related services.

Banks should focus more on the implications of a new technology related to changing needs in skill formation and consequences in the organization of business processes than on pure technical equipment.

Banking industry should promote such as shared ICT development processes in the banks or facilitate a forum where banks could cooperate in developing ICT products to facilitate speed, convenience, and accurate services, this will help Rwanda banks to be informed and incorporate new ICT innovations such as ATM revolution.

Bank should recruit personnel with ICT skills in their daily operations.

Banks should devote more resources to develop, implement and secure ICT services.

Rwanda banks should intensify investment in ICT products to facilitate speed, convenience, and accurate services.

Bank management should focus more on the implications of new technology related to changing needs in skill formation and consequences in the organisation of business processes than on pure technical equipment.

Suggestions for further Research

Future researcher should focus on the interest of bank customers to the services made possible by ICT use.

Future researcher should also be concentrated on the use of ICT to better the services of other Rwanda's financial services industry such as microfinance and investment sectors, which were dominated by the banking sector in the past years, this study should also be extended to areas like e-marketing .

Future researcher should focus on ICT development and quality of customer services

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APPENDIX I: TRANSMITTAL LETTER



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Tel: +256- 41- 266813 / +256- 41-267634
Fax: +256- 41- 501974
E- mail: admin@kiu.ac.ug,
Website: www.kiu.ac.ug

OFFICE OF THE COORDINATOR, BUSINESS AND MANAGEMENT SCHOOL OF POSTGRADUATE STUDIES AND RESEARCH (SPGSR)

January 27, 2011.

Dear Sir/Madam,

**RE: REQUEST FOR MUSONERA MARTIN MBA/20038/82/DF
TO CONDUCT RESEARCH IN YOUR ORGANIZATION**

The above mentioned is a bonafide student of Kampala International University pursuing a Masters of Business Administration (Management).



He is currently conducting a field research of which the title is **"ICT. use and Development of Banking Operations in Selected Banks of Rwanda."**

Your organization as been identified as a valuable source of information pertaining to his research project. The purpose of this letter is to request you to avail him with the pertinent information he may need.

Any information shared with him from your organization shall be treated with utmost confidentiality.

Any assistance rendered to him will be highly appreciated.

Yours truly,

Mr. Malinga Ramadhan
**Coordinator
Business and Management (SPGSR)**

"Exploring the Heights"

APPENDIX II: INFORMED CONSENT

MUSONERA Martin
Kampala International University
P.Box 2000
Kampala Uganda
E-mail: mmusomar2020@yahoo.fr
Date 5th March 2011

To the Mayor of GASABO District

Dear Sir,

RE: Permission to conduct research in your District

I hereby apply to be allowed to do my research in your District in the fulfilment of the requirement of the award of Masters in Business Administration at Kampala International University. This study is entitled **"ICT use and Development of banking operations in selected banks of Rwanda"**.

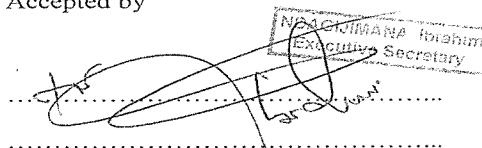
I hope it will be helpful to the community, banks, managers, Investors, policy makers and government as it will highlight how ICT use could affect the development of banking operations

Yours truly,



MUSONERA Martin

Accepted by



NDACIIMANA Ibrahim
Executive Secretary

for Mayor of GASABO District



APPENDIX II: INFORMED CONSENT

MUSONERA Martin
Kampala International University
P.Box 2000
Kampala Uganda
E-mail: mmusomar2020@yahoo.fr
Date 5th March 2011

To the Mayor of GASABO District

Dear Sir,

RE: Permission to conduct research in your District

I hereby apply to be allowed to do my research in your District in the fulfilment of the requirement of the award of Masters in Business Administration at Kampala International University. This study is entitled **"ICT use and Development of banking operations in selected banks of Rwanda"**.

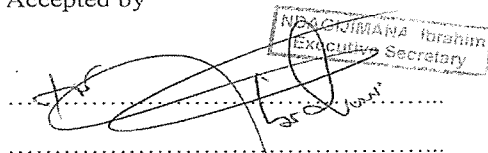
I hope it will be helpful to the community, banks, managers, Investors, policy makers and government as it will highlight how ICT use could affect the development of banking operations

Yours truly,

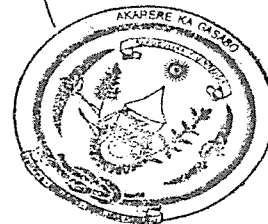


MUSONERA Martin

Accepted by


.....
.....

for Mayor of GASABO District



APPENDIX II-Informed Consent

MUSONERA Martin

Kampala International University

P.Box 2000

Kampala Uganda

E-mail: mmusomar2020@yahoo.fr

Date 5th March 2011

To the Mayor of NYARUGENGE District

Dear Sir,

RE: Permission to conduct research in your District

I hereby apply to be allowed to do my research in your District in the fulfilment of the requirement of the award of Masters in Business Administration at Kampala International University. This study is entitled **"ICT use and Development of banking operations in selected banks of Rwanda"**.

I hope it will be helpful to the community, banks, managers, Investors, policy makers and government as it will highlight how ICT use could affect the development of banking operations

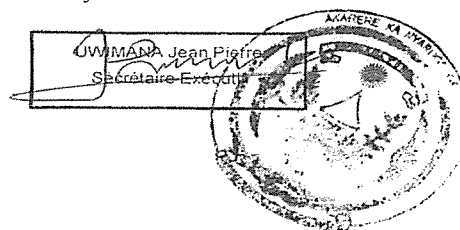
Yours truly,



MUSONERA Martin

Accepted by

P.O. UWIRIANA Jean Pierre...
Executive Secretary Nyarugenge
District.
for Mayor of NYARUGENGE District



APPENDIX II-Informed Consent

Transmittal letter

MUSONERA Martin

Kampala International University

P.Box 2000

Kampala Uganda

E-mail: mmusomar2020@yahoo.fr

Date 5th March 2011

To the Mayor of Huye District

Dear Sir,

RE: Permission to conduct research in your District

I hereby apply to be allowed to do my research in your District in the fulfilment of the requirement of the award of Masters in Business Administration at Kampala International University. This study is entitled **"ICT use and Development of banking operations in selected banks of Rwanda"**.

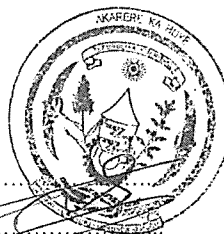
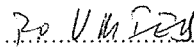
I hope it will be helpful to the community, banks, managers, Investors, policy makers and government as it will highlight how ICT use could affect the development of banking operations

Yours truly,



MUSONERA Martin

Accepted by



for Mayor of Huye District

APPENDIX III: Content Validity Index for bank employees

Questionnaire	Content validity index(CVI)
bank employees questionnaire	0.78

The CVI for the administered instrument were computed using the following formula (Amin, 2005): $CVI = \frac{R}{R+IR}$

Where CVI: Content validity index

R: Relevant questions

IR: Irrelevant questions

The indices were computed as shown in the table below

Instrument	Judgement/Assessment questions			Computation
	Relevant(R)	Irrelevant(IR)	Total(R+IR)	$\frac{R}{R + IR}$
Questions of banks employees	33	9	42	0.78

According to Amin (2005) the instrument were be certified valid as he stipulated the minimum content Index to be at least 0.7.

APPENDIX IV-RESEARCH INSTRUMENT

Questionnaire For Bank employees

Dear Respondent,

Re: Request for Assistance in Research

It is with great aspiration that I, MUSONERA MARTIN a student of Kampala International University, bring to your attention my desire for your assistance in my research struggle under topic "**ICT use and development of banking operations in selected banks in Rwanda**", which is requirement in the award of a degree of masters MBA (Management). This research is for purposes of academics and your assistance is of great importance and will be treated confidential.

Kindly spare for me some little time and fill in this questionnaire to the best of your knowledge without fear or favour.

MUSONERA MARTIN

MBA CANDIDATE

SECTION A: Background Information

Please encircle the applicable answer, and kindly be as objective as possible.

1. Gender

Male ☐

Female ☐

2. Age bracket

20-29 ☐

30-39 ☐

40-49-50 and above ☐

3. Education

Diploma ☐

Degree ☐

Master ☐

4. Name of bank.....

5. How long have you worked with this institution?

One year and below ☐

2years-4years ☐

5 years and above ☐

5. What is your staff designation in this Bank?

Manager ☐

Teller ☐

Marketing department staff ☐

ICT department staff ☐

Accountant ☐

SECTION B

Questionnaire For Bank employees

In this selection please indicate your response by Ticking the suitable number for each item in the corresponding column below (e.g. 1 for strongly disagree, 2 for Not sure, 3 for Agree, and 4 for strongly Agree)

Level of ICT use in Rwanda banking operations

ICT use	Strongly disagree (1)	Disagree(2)	Agree(3)	Strongly agree (4)
The bank has access to the internet				
You use a computer connected to internet at least weekly				
IT systems are dedicated for managing orders or purchases				
IT systems are useful for customer/bank interaction				
The bank has a website or a home page				
Bank uses website to market own product				
Bank provide online financial services to customers via the internet				
Bank provide security facilities in its daily operations				
Bank uses internet for interaction with public authorities				

Degree of utilization of ICT products in banks

UTILIZATION OF ICT PRODUCTS	Strongly disagree (1)	Disagree(2)	Agree(3)	Strongly agree (4)
There has been a positive response among customers towards Spread of ATM				
There has been a positive response among customers towards Spread of Electronic funds transfer				
There has been a positive response among customers towards Smart Cards				
It has been a positive response among customers towards Electronic Home and Office Banking				
There has been a positive response among customers towards Electronic Data Interchange				
There has been a positive response among customers towards Computerized Credit Rating				
There has been a positive response among customers towards Telephone and internet Banking				
There has been a positive response among customers towards MICR cheques				
There has been a positive response among customers towards daily calculation of account program				

enefits of ICT adoption in banking operations

Benefits	Strongly disagree (1)	Disagree(2)	Agree(3)	Strongly agree (4)
Adoption of ICT allows banks to meet customers' needs faster				
Adoption of ICT facilitates high skilled financial analysis				
Adoption of ICT facilitates easily to access money 24/7 hours				
Adoption of ICT Enhances Services with high added value				
Ability to Access banking services at any location and any time				
Adoption of ICT helps the bank handle more customers				
Adoption of ICT makes International Market accessible				
Adoption of ICT facilitates wide coverage				
ICT use in Rwanda banking operations has been a success				

Challenges of ICT adoption in Banking operations

Challenges	Strongly disagree (1)	Disagree(2)	Agree(3)	Strongly agree (4)
Ignorance among the customers on how to use ICT products				
Fear among employees and internal resistance against innovation				
Lack of funds/money to facilitate the application and use of ICT in service delivery				
Customers do not perceive online banking to be safe				
Lack of trust on ATM usage, customer prefer to bank their money face to face on the counter instead of using ICT facilities				
Bank has difficulties in recruiting personnel with ICT skills				

Development on banking operations

Please rate your performance in terms of performance at work, on each of the following items.
Your respective answers should range between 1= strongly disagree 2 = disagree 3 = agree
4 = strongly agree

banking operations					
The bank involves ICT to protect customer data					
The bank considers customer decisions					
The bank involves ICT in planning					
The bank involves ICT for proper market segmentation					
The bank involves ICT for competitive strength					
The bank uses ICT to facilitate accurate records					
The bank involves ICT in production process of existing and emergency of new products					
ICT assists bank managers to take quality decisions					
The bank uses ICT for proper forecasting					

Interview guide schedule for the bank management

1. What needs and objectives have driven your bank towards establishment computer based information Technology?
2. What are challenges faced by your bank before ICT adoption in Rwanda?
3. What ICT products has your bank invested in?
4. What benefits has your bank enjoyed through the ICT inception, over its competitors?
5. Did you have difficulties in recruiting personnel with ICT skills?
6. What challenges does your bank face in implementing computer based information technology in its business operations?
7. What are banking operations that have been revolutionized through the use of ICT?
8. What are ICT securities do use in your daily operations?
9. Does ICT improve the banking system?

APPENDIX V: RESEARCHER'S CURRICULUM VITAE

Personal Profile

First Name: MUSONERA

Surname: Martin

Date of Birth: 1977

Place of birth:

Sector: KIGOMA

District: Huye

Province: South

Country: Rwanda

Current residence

Sector: Gasaka

District: Nyamagabe

Province: South

Country: Rwanda

Father's name: GATERA Athanase

Mother's name: MUKABARANGA Belia

Nationality: Rwandese

Marital status: Married

Phone number: (+250)0788559496

E-mail: mmusomar2020@yahoo.fr

Educational Background

From 2003 to 2007: Bachelor's degree of math-physics and Education at National university of Rwanda

From 2002 to 2003: Intensive Language Course of English certificate at National university of Rwanda

From 1996-2001: Secondary Level Diploma (Math-Physics) at G.S.Kigeme

1985-2002: Primary Level certificate at Mbogo primary school

Work Experience

From April 2006-2007: Teacher of mathematics at E.s.Nyamagabe

From 2008-2010: Deputy Head teacher in charge of studies at E.S.Nyamagabe

2011: working with Banks in ICT

Other Relevant Data

July 2002: Good governance training

2004: ICT training in MS word, Excel, Access, Power point, Programming, Mat lab

2005: Leadership and Good governance training

2005: Environment Protection training

2008: Trainer of mathematics and sciences training

2010: School management training

October 2010: ICT training in data management

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