AN INVESTIGATION INTO THE IMPACT OF ICT ON ZIMBABWEAN BANK’S CREDIT RISK MANAGEMENT

TONNY T. CHINOMONA - R113094Q

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SUPERVISOR: PROF. G KABANDA
DECLARATION

I, Tonny T. Chinomona, do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the acknowledgements and references included in the body of the report, and that it has not been submitted in part or in full for any other degree to any other university.

_________________  __/__/__
Student's Signature   Date

Date Approved for submission

____________________  ____/____/____
Professor G. Kabanda   Date
Supervisor
DEDICATION

I dedicate this work to family who encouraged me to work hard and complete this programme. I also want to dedicate this to my wife, for her patience and understating.
ACKNOWLEDGEMENT

I owe my greatest gratitude to my supervisor Professor Kabanda and Dr Madzikanda for their guidance throughout my research. I also would like to thank my friends Mako, Wonder, Gamu, Godfrey, Brian and Alfred for their support throughout the entire programme. Not forgetting group four members Tafadzwa, Tich, Mugo, Chiwaka and Amon for their support and team work.
ABSTRACT

Information and Communication Technologies are reshaping the business models of every industry across the continent. Faced with credit risk banks are taking advantage of technology advancements being developed and adopting latest credit risk tools and models in the market in order to reduce credit risk. Some banks are investing in these technologies without proper evaluations and cost benefit analysis. This research investigated the impact of these technology investments on the Zimbabwean banking industry.

To evaluate the impact of ICT on credit risk, quantitative research approach was used on the selected ten banks out of seventeen banks in the Zimbabwean banking industry. Ten questionnaires were sent to each of the ten banks to the people that use credit and risk systems, and those that maintain the systems. The questionnaire used open ended questions, closed questions and Likert scale questions. Data collected was analysed using SPSS to test for the correlation amongst the variables and to check whether ICTs can be used to reduce credit risk in the Zimbabwean banking industry.

Evidence collected showed that 81% of the respondents agreed that ICTs play a crucial role in ensuring that the bank adopts latest internal rating models and credit risk tools. However, Information Systems do not reduce information asymmetry which causes credit risk. In order to fully utilise ICTs, the research recommends that banks must ensure data stored in the systems be accurate and complete. This can be done through continuous data cleanup and regular user training in order to increase information systems and reduce system errors. The research focused on the banking industry and there is need for further study into the impact of ICT on the Micro-Finance Industry.
ACRONYMS

CR Credit Risk
CRM Credit Risk Management
DSS Decision Support Systems
ESS Executive Support Systems
IA Information Asymmetry
ICT Information and Telecommunication Technology
IS Information System
IT Information Technology
MIS Management Information Systems
RBZ Reserve Bank of Zimbabwe
TPS Transaction Processing System
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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Credit Risk can be defined as the potential that a bank borrower or counter party fails to meet the obligations on agreed terms (Raghavan, 2003). This form of risk plays a significant role in the survival of any financial institution because failure to manage this risk may result in huge losses or even liquidation of the banking institution. Tapiero (2004) identified two sources of uncertainty in credit risk, which are default by a party to a financial contract and a change in the present value (PV) of future cash flows resulting from changes in the financial market conditions, economic environment and interest rates, to mention just a few. Evidently, the lending business is thus, a risky business. Banks assume high levels of credit risk by virtue of engaging in the lending business. They lend to parties who include other banks, government, individuals, and companies.

Faced with such high credit risk, financial institutions develop strategies, set policies, invest in resources through staff training and development, and adopt robust Information Systems in order to reduce and mitigate credit risk. To implement an effective credit risk management programme, the Australian central bank, OesterreichischeNationalbank(2004) suggests that there is need to identify and assess potential risks inherent in all credit products and credit activities as this will form the foundation of developing sound policies and procedures to mitigate credit risk.
Information and Communication Technologies (ICTs) have become a major instrument or tool in enabling business operations and also in managing and monitoring risk. According to Asenso-Okyere and Mekonnen (2012) ICT, “include hardware, software, media for collection, storage, processing, transmission and presentation of information in any format (i.e., voice, data, text and image), computers, the Internet, CD-ROMs, email, telephone, radio, television, video, digital cameras etc” (p.1).

Technological trends in ICT are highly dynamic and the rapid changes in ICT call for variations in business models, investments policies, changing risk profiles of projects or even business and social cultures. It is important that governments, managers or even entrepreneurs continuously monitor and invest in the new technology to ensure they remain competitive through the customisation of their products and services to suit the needs of their customers. Somuyiwa (as cited in by Somuyiwa & Adewoye, 2010) stated that ICT is fast becoming one of the main drivers of change, thus, like any other complex adaptive system, ICT can help management tackle new strategic challenges at ease. The research investigated the effectiveness of ICT systems in mitigating credit risk in the Zimbabwean banking industry.

1.1 Background to the Study

Since the dollarisation of the Zimbabwean economy, the banking industry has faced different challenges which span from high interest rates, low investments, high default risk, and stiff competition from the telecommunications industry (Gono, 2012) and most recently stringent central bank regulations. To protect themselves from competition and the risk inherent in the banking business, whilst meeting the minimum requirements from the regulatory authorities, banks invest in robust
Information and Communication Systems (ICTs). These ICTs enable banks to increase efficiency, reduce system down time, offer customised products and services, and also assist in creation of new products and improved measurement and quantification of risk (Somuyiwa & Adebayo, 2011).

One of the banks’ main sources of revenue is derived from the lending business, and because offering credit is very risky, it is the role of the central bank to ensure that banks have sound risk management practices so that the investors and depositors funds are protected. Failure to adopt sound risk management practices and policies can have an negative impact on the individual bank and the economy as a whole. If one is to look at the Zimbabwean economy, Njanike (2009) suggested that the main cause of the banking crisis in Zimbabwe during the 2003 to 2004 period was poor credit risk management practices, speculative lending and high concentration of credit in certain sectors. As much as banking institutions attempt to mitigate risk, some risk management techniques may result in residual risk, thus banking institutions must employ robust procedures and processes to control these risks (Gono, 2011).

Ho and Yussof (2009) argue that loans are the greatest source of credit risk. According to Gono (2012) the banking sector loans and advances amounted to US$3.27 billion as at 30 June 2012, and this represents a growth of 18.5% from US$2.76 billion as at 31st December 2011, with commercial banks dominating with a share of 82.92% of total loans. If a significant proportion of total loans default, many banks will collapse and the entire Zimbabwean economy will plunge into serious financial crisis because of the magnitude of the banks’ investments in loans and advances. This justifies the Zimbabwe central bank’s thrust on regulatory conformity to Basel II across all banks.
Poor credit risk management systems, policies and procedures can lead to high levels of non-performing loans. According to Gono (2012), one of the main problems that negatively affected Royal Bank before its closure was that 99.29% of its total loan book of about $1.52 million as at 31 May 2012 was stressed. Gono (2013) also claimed that Royal Bank had poor Management Information Systems (MIS). If the bank had adequate ICTs the extent of defaults would have been identified and control measures taken timeously, and the rate at which loans turn bad would have been lower.

One way that could be used to prevent some of these practices is investing in robust ICTs that will enable banks to identify, measure and mitigate risk at ease. However, DAC (2004) argues that investments in ICTs can be very costly and the investment impact is largely un researched and easily exaggerated, thus making it very difficult to justify the investment. With this in mind and looking at the current economic environment, it might be very difficult for banks to invest heavily in ICTs, with the high liquidity risk and political uncertainty. Standish Group (as cited in Mohamed & Singh, 2012) reported that at least 67% of its ICT projects failed due to failure to justify the investments, on the basis that ICT does not necessarily guarantee high returns. However, some banks are investing millions in ICTs and if we consider the year 2010 alone CBZ Holdings and ZB Financial Holdings invested almost $3 million each in major ICT banking systems (CBZ Holdings Limited Annual Report 2011, ZB Financial Holdings Limited Annual Report 2011).

There are many credit risk management systems out there, which banks can invest in, in order to manage credit risk. These systems are mainly off the shelf and mostly suite economies that are advanced. However, some local banks and foreign banks operating in Zimbabwe are also acquiring them and customising them to suit the Zimbabwean situation. As an example, Stanbic Bank and Standard Bank are all
using a credit risk management system called OPICS risk. Most recently, ZB
Financial Holdings is in the process of implementing Almonde, a risk management
system that will help mitigate not only credit risk but also market risk and
operational risk.

1.2 Statement of the Problem

The Zimbabwe banking industry has experienced high default rate risk arising from
the current adverse economic conditions (Gono, 2013). As much as banks invest
in resources, training, credit risk models, and engage credit rating agencies to
reduce credit risk, the rate of default is still very high. Fink and Disterer (as
cited in Somuyiwa & Adebayo, 2011), state that “it is now commonly accepted that
information and communication technologies (ICTs) and systems provide many
benefits to companies, including small and medium enterprises (SMEs), to make
them more efficient, effective and competitive” (p.68). Crowston, Sawyer, and
Wigand (2001) also concur that information-intensive industries such as banks
show the greatest impacts due to ICT uses. As such, there is need to evaluate the
impact of ICTs on Credit Risk Management.

1.3 The Aim of the Study

The aim of this study was to evaluate and assess the impact of ICTs on Credit Risk
Management and then suggest ways in which banks can effectively and efficiently
use ICTs to mitigate credit risk.
1.4 Study Objectives

The study seeks to achieve the following objectives.

a) To evaluate the potential impact of utilising ICT systems on credit risk.
b) To determine the effectiveness of ICTs in CreditRiskManagement (CRM).
c) To determine other factors that affect CRM systems.
d) To assesssthe potential impact of ICT on CRM techniques to ensureBasel II compliance.
e) To recommend to management how to improve CRM systems efficiency.

1.5 Research Questions

a) What is the potential impact of investing in ICTs when managing CR?
b) Are ICTs tools necessary to effectively manage credit risk in the banking industry?
c) What other factors affect CRM and how can ICT address resultant risk issues?
d) Are the local CRM techniques compliant with Basel II and how ICT fits in?
e) How can a bank increase the efficiency and effectiveness of its CRM system?
1.6 Hypothesis

The basis of the conclusion for this research was deduced on the following hypothesis.

*There is a relationship between ICTs and CRM tools. Thus, effective use of CRM systems would reduce the risk of loan defaults and improve loan repayments.*

1.7 Justification

Chijoriga (as cited in Peterson & Bohman, 2008), argue that the magnitude and the level of loss caused by credit risk compared to others are severe to cause bank failures. Given the significance of the value that financial institutions invest on advances and loans to the market and the ever increasing default rate risk, there is need for banks to invest in new technologies, processes and procedures to mitigate credit risk. Ectasecredit risk management systems bring opportunities and has the potential of reducing the effort required to mitigate credit risk and risk management in general. The study showed how best the bank’s credit and ICT managers can use ICT in mitigating credit risk. As much as ICTs are ideal in CRM, ICTs have their own limitations which need to be identified and dealt with. The research outlined and suggested ways of dealing with these limitations and potential risks associated with ICT based CRM solutions.

Research has been conducted on the impact of ICT in banking in advanced economies and some in developing economies. These have led to the development of ICT systems such as Almonde, Eagleye and Opics risk (MISYS, 2013) which are used to manage risk in developed economies. However, there is little research that
has been carried out on how such ICT investments affect credit risk management in developing countries such as Zimbabwe because all countries are unique. This research will also help system developers in the customisation of systems that will be used in the Zimbabwe banking sector. The research brought to light areas that need attention for banks to fully utilise CRM systems by fully automating all the processes in CRM and alleviating challenges faced by users when using these Information Systems.

1.8 Scope of Research

The research study was limited to the Zimbabwean banking industry, focusing on the Business Risk Management department, ICT department and other departments that issue loans. Quantitative research approach was used to collect data. Questionnaires were administered to a sample of one hundred participants covering ten banks across Zimbabwe. Secondary data sources were used and data was collected from banks’ financial reports, RBZ, and other international organisations such as African Development Bank. The research ran for approximately five months.

1.9 Limitations to the study

Every research has challenges and limitations, and this study was not spared. In most studies the response rate is always a challenge and this is because there is no obligation or motivation for the respondents to respond. To deal with this, the researcher made the questions as short as possible and attempted to speak to the respondents and explained the significance of this research. This helped to convince participants to respond to the questionnaires and provide accurate
information. Simple English and short questions were used to deal with respondents who were likely to fail to understand and interpret questions.

Some questionnaires might not have been completed by the actual targeted respondents. Thus, the researcher hand delivered the questionnaires to all respondents and then sent an email to all respondents with the soft copy of the questionnaire. To guarantee accurate information the researcher gave assurance and explanations to the respondents that the research was purely an academic and not a job evaluation exercise.

1.10 Dissertation Structure

This was the first chapter of the research which was introducing the study area, the scope of the research and the objectives that were studied. The summary of this chapter is on the following page. Chapter two will review literature on how ICTs have been successfully used in the business arena and other sectors in general, also including how they have negatively affected business processes and procedures. Tools used to manage CR and managerial processes surrounding CR will also be discussed. Studies carried out on the impact of ICT in risk management will also be analysed and evaluated to better understand the role played by ICT in managing risk. Basel II, which is now the requirement from the RBZ, is also going to be discussed and the research will focus on credit risk and how Basel II has affected banks’ credit risk management.

Chapter three will look at how data was collected, and for this research, data was collected by means of questionnaires. The research data collection tools were administered to the employees of the selected banks. Sampling and sample size is
also going to be covered in this chapter; random sampling was used to select a sample of at least one hundred participants.

By making use of statistical tools and methods to come up with the presentation and analysis of data will be covered in chapter four. For this research SPSS and excel was used in the analysis of data. Correlation analysis and hypothesis tests were also used to analyse data. To present data, statistical graphs were used and these include bar graphs, histograms, and pie charts.

Conclusions and recommendations will be drawn from the research findings and no assumption will be made for data which was not collected. The last chapter will also contain recommend strategies that management can adopt in order to fully utilise ICT in mitigating credit risk so as to improve loan repayments and mitigate default risk.

1.11 Summary

This chapter introduced the research topic on the impact of ICT in credit risk. For banks to make profits, they issue loans to different stakeholders and issuing loans to counterparties is very risky, hence the need to implement credit risk management tools. Many banks have collapsed and liquidated due to poor risk management systems and processes. In order to protect depositors funds and the economy as a whole, the central banks requires all banks to be Basel II compliant and also banks to ensure that they have an effective risk management system. This research studied the Zimbabwean banking industry in order to find out how banks use ICT to mitigate credit risk. Hence the research covers the integration of ICT into credit risk management.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

A lot of literature has been written and published on how ICT is being used to enhance efficiency and create competitive advantage. Peterson and Bohman (2008) argue that components of CRM systems used in developed economies are different from those applicable to less developed economies. Thus, the literature that was reviewed covers the area of ICT and credit risk management focusing on the following areas:

- What is ICT and why is it important?
- Types of Information systems used in the banking industry and other industries
- How to evaluate ICTs
- Managerial processes surrounding the use of ICTs
- What is CRM and why is it important?
- ICT based managerial tools used to manage CR
- How ICT systems enhance CRM in Zimbabwe
- Integrating ICT and CRM
- Highlights of some of the challenges of ICTs on effective CRM methodologies.

The research attempted to integrate ICT and credit risk management because ICT plays a central and critical role in all businesses and societies. After analysing ICT and credit risk theories, a framework was developed and it is presented at the end of this chapter.
2.1 What is ICT and why is it important?

2.1.1 ICT Definitions and Roles

Haag and Cummings (2012) defined information technology as “any computer-based tool that people use to work with information and support the information and information-processing needs of an organisation” (p. 518). According to Turban and Volonino (2009) Information and Communication Technology (ICT) term can broadly be defined as an organisation’s collection of information systems, hardware, communication devices, people, and the management that oversees them (O’Brien & Marakas, 2009). From these definitions one can deduce that ICTs play a crucial role in enabling banks to achieve their objectives through effective integration of various resources. It also shows that ICTs are broad in nature and they also cover other areas not just the hardware, software and network technologies. Thus, management should not separate business processes from ICT but rather, integrate the two as they cannot operate separately.

From Figure 2.1, Information and Communication Technologies (ICTs) can be used to support business models and this enables the organisation to attain its goals at ease. Thus, in order for a financial institution to succeed, it must make use of ICT in the integration of its resources. This in turn will enable quick data collection and processing, leading to improved performance and attainment of organisational goals and objectives. Thus, ICTs in the banking industry play a crucial role in supporting banks business models and this will enable them to achieve their objectives through quality products and services provision.
Laudon and Laudon (2009) identified various roles that information systems play in business amongst them include the following:

- Increasing productivity, efficiency and agility
- Enabling the organisation to develop new products
- Enhancing customer intimacy and customisation of services
- Quick and accurate decision making which assist in the attainment of competitive advantage, thus ensuring the going concern of the organisation.

Due to the magnitude of the risks associated with credit risk (Peterson & Bohman, 2008), there is need for banks to evaluate and assess areas where it can make use of ICTs, in order to reduce risk of bank failure. The next section looks at how ICT has affected other sectors of the economy, identifying areas that the banking industry can benefit from the researches carried out.
2.1.2 ICT Impact on the economy

Jalava and Pohjola (as cited in Bankole, Shirazi & Brown, 2011) studied the economic impact of ICTs on human development and discovered that ICTs have a positive impact on economic development in a range of contexts. They argued that ICTs are the drivers of economic growth in developing countries. Thus, by employing the right people, and putting them on right levels, exploitation of ICTs will be effective when this is achieved. Subsequently, banks need to ensure its ICT users are skilled or are trained to ensure that they are capable of utilising ICTs in order to increase systems productivity. Banks will be able to improve their service delivery through increasing workers and systems productivity (DAC, 2004). A research by DAC (2004) also showed that there was evidence from the OECD countries that ICTs facilitated their growth through increasing productivity. In the same report, suggestions were also made that developing countries can also benefit from ICT if they invest in ICTs. However, the findings also showed that ICT investments do not show immediate benefits but rather long-term. Thus, bank managers need to consider this as well when evaluating or appraising a CRM system.

A survey carried out by Somuyiwa and Adebayo (2011) analysed ICT usage on logistics activities of manufacturing companies in southwestern Nigeria. They discovered the factors that were limiting the widespread adoption and use of ICT, and these included “the cost of technology, uncertainty over the business benefits and impacts, and the lack of relevant internal ICT expertise (Somuyiwa & Adebayo, 2011)” (p. 73). From this survey, one can deduce that banks need to have technical experts that have the knowledge of the capabilities of ICT systems. Having this knowledge will go a long way in ensuring efficient and effective CRM systems evaluation and use.
From the analysed studies, there is limited information on the specific real advantages and disadvantages on the use of ICT on specific areas of business. The only benefit that was highlighted by the authors was that ICTs help organisations grow through increasing productivity. Thus, there is need for an investigation to determine whether, this productivity is originating from ICTs, and establishing if there are other benefits and limitations arising from the adoption of ICT. This will help remove uncertainty on capabilities of ICT based credit risk management systems.

Another research carried out by Ciborra (2004), studied the link between risk and digital technologies (ICTs) and argued that risk management must also cover the risks associated with digital technologies. Thus ICTs also have their own imbedded inherent risk and this also needs to be assessed and controlled. This shows that ICTs also have inherent risk that can also hamper the organisations operations such as the ones to do with management and control of CR. The Bank of America (as cited in Baltazan & Phillips, 2009), the Bank of America, Commerce Bancorp, PNC Financial Services Group, and Wachovia were victims of crimes, when someone tried to obtain customer data in order to sell it to law firms and debt collection agencies.

Arguments have been forwarded suggesting that information systems make it easier for unauthorised intruders to get access to large amounts of data because data are stored on a central location (Baltazan & Phillips, 2009). Thus, banks must increase ICT security because customers view security as a key factor when choosing a bank, unauthorised tampering or access to clients' information can have significant reparations (Zimucha, Zanamwe, Maduku, Mapungwana, Chakwizira, & Chimwayi, 2012). This shows that once a bank has a centralised ICT based credit risk management system there is also need to have a robust
information security controls and systems in place, to protect confidential information and data integrity.

2.2 How banks can make use of different types of Information systems

In order to fully understand how ICTs affect organisations there is need to look at the different information processing needs of an organisation. Laudon and Laudon (2009) identified four groups that need different types of systems to deliver the information required to manage the organisation. Figure 2.2 illustrates the different types of information systems and how they are integrated in order to enable information dissemination leading to informed decisions for the organisations to run smoothly.

As business operates, it generates business transactions and in the banking industry these transactions include account withdrawals, issuing of loans and collecting interest to mention just a few. In order to manage these transactions banks can make use of transaction processing system (TPS). Laudon and Laudon (2009) define a TPS as a computerised system which performs and records the daily business transactions necessary to conduct business. Thus, these systems are mainly used on daily data entry systems with the principal purpose of tracking and monitoring the flow of all business transactions. With these types of information systems, banks will be able to capture and track all its loan accounts and customers efficiently and effectively.
Having collected all the business transactions, management information systems (MIS) produce reports on the firm’s current performance and predict future performance (Laudon & Laudon, 2009). Haag and Cummings (2012) pointed out that MISs mainly “deal with the planning for management and use of information technology tools to help people perform all tasks related to information processing and management” (p. 351). By investing in MIS, bank middle managers will be able to plan and make decisions pertaining to customers’ needs, interest rates to be charged and the discretionary lending limits to impose on loan officers depending on market trends and company policies.
Management is required to make non-routine strategic decisions. The ever-changing operating economic environment renders useless some predefined solutions. Hence, there is need for decision support systems to help middle management (Laudon & Laudon, 2009). Haag and Cummings (2012) also agree that decision support systems (DSS) are highly flexible and interactive IT systems designed to support decision making when problems are not structured. Economical, political and global financial crisis are some of the challenges banks are facing when managing credit risk, therefore DSS will enhance the decision making process.

Laudon and Laudon (2009; 2010) defined Executive Support Systems (ESS) as systems that help senior management to make decisions. Since data needed by top executives is normally not detailed, the ESSs produce the information needed in the form of graphs and charts delivered via portals using many sources of internal and external information. Just like DSS, decisions made do not have procedures to arrive at a solution. Having ESS will go a long way in simplifying the information needed by the banks’ policy makers to make long term objectives regarding the risk profiles of the banks’ credit strategies.

2.3 Evaluation of ICT investments

A research carried out by Woksepp and Olofsson (2006) shows that ICT investments tend to be costly regardless of how little or minor the resources that need to be committed to the ICT investment. Given the current liquidity situation experienced in the country (Zimbabwe), it is very difficult to justify costly ICT investments in businesses later on, banks. Irani et al. (as cited in Wokseppin Olofsson, 2006) argue that many managers often view ICT investments as expenses that consume resources rather than capital expenditure that will benefit the organisation in the long run. This is mainly because it is difficult to estimate the useful life of ICT investments if we are to look at the rapid changes in the ICT
arena. Thus the economic life of such an investment is usually difficult to estimate (DAC, 2004). Hence, ICT investments need to be continuously questioned and also evaluated like any other investment projects in order to determine whether the benefits overweigh the costs (Dadayan, 2006).

Ballantine, Levy, Martin, Munro and Powell (2000) argue that evaluation of ICTs tend to be more subjective and qualitative in nature as opposed to the use of financial measures. However, Somuyiwa and Adebayo (2011) analysed ICT usage on logistics activities of manufacturing companies in south-western Nigeria and in their research they used quantitative research for their research when they were analysing one hundred manufacturing companies and it proved effective. Thus, evaluation of ICT systems can be both done using either quantitative or qualitative approaches. Ballantine et al. (2000) identified three elements that need to be included when one is carrying out an ICT evaluation and these include the purpose of evaluation, the process of evaluation and the people affected by the ICT evaluation. By clearly stating why the evaluation is being done will help in reducing the bias that results from subjectivity and qualitative researches. ICTs cannot operate without people hence, there is need to involve people that use and that are affected by the ICTs.

The diagram in Figure 2.3 shows six broad objectives that every ICT project must aim to achieve (Baltzan & Phillips 2009). ICT projects must aim to reduce costs and in credit risk management, this is the cost of replacing defaulted cash flows (Jorion, 2003) and credit administration costs. However, some managers fail to justify ICT investments because their ICT projects only aim to automate business processes ignoring other strategic goals that ICT projects bring to the organisation as a whole. For example building an interface between two systems (loan system and core banking system) one can mention the benefit of such an interface as to speed up the loan transaction. However, a strategic benefit of the interface could be the
elimination of human errors that lead to huge costs to the banking institution. These costs include wrong interest rates, wrong deal tenor, and loan amount to mention just a few. Thus, it is of paramount importance that ICT investments provide strategic benefits and not just automation.

<table>
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<tr>
<th>Information Technology Project Goals</th>
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<tr>
<td>Reduce Costs/Improve Productivity</td>
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<td>Improve Customer Satisfaction/Loyalty</td>
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<td>Create Competitive Advantage</td>
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<td>Generate Growth</td>
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<tr>
<td>Streamline Supply Chain</td>
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<td>Global Expansion</td>
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Figure 2.3 Information Technology Project Goals From Business Driven Information Systems by P. Baltazan, A. Phillips, 2009, McGraw-Hill Companies, Inc

2.4 Managerial processes surrounding the use and security issues in ICT

ICT is very dynamic and this makes it difficult for banking institutions to sustain competitive advantage. Laudon and Laudon (2010) argue that competitive advantage that arise from investing in strategic systems do not last long enough to ensure long term profitability. This is because ICT is very dynamic, new technology is always being developed and ICTs makes it very easy for competitors to imitate products. For example, if a bank introduces a new credit product on the market, other players can simply copy the product without having to invest heavily in Research and Development (R & D).
Investing in R & D tends to be very expensive, thus some banks adopt a wait and imitate strategy when it comes to ICT investments, although this eliminates the first mover advantage. Molina-Castillo, Rodriguez-Escudero, and Munuera-Aleman (2012) argues that first mover advantages include creation of switching costs and pioneering products which are products or services that introduce new functionality and/or improvements to existing functionality in the market. This research will need to investigate whether such strategies are being employed in the Zimbabwe banking industry and also suggest ways to compete effectively.

There are many ethical issues that have arisen due to advances in ICTs. These span from monitoring employees to ensure more time is spend on company business (Laudon & Laudon, 2009) and to job security (Ballantine et al. 2000). Baltzan and Phillips (2009) argue that ICT helps to bridge the gap by improving communication between business people and ICT technical people. Hence, the two complement each other. However, Laudon and Laudon (2009) suggest that ICTs are reducing business jobs and creating ICT technical jobs. A research carried out by the U.S. Bureau of Labour Statistics (as cited in Laudon & Laudon, 2009) claims that in 2006 and 2007, 95% of new jobs were created in the US service sector, and more than half of these were ICT jobs. There is also need for an investigation to determine the impact of ICTs in Zimbabwe on the risk management job industry and other ethical issues resulting from ICT.

H7: The perceived cost of ICT investments increases the adoption of ICTs to reduce credit risk.
2.5 Important of Credit Risk

Tapiero (2004) defined risk as the negative outcome or the undesirable outcomes and their implications for individuals and firms. Holton (2004) defined risk as the elements that will result in a risk and Jorion (2003) argues that it involves the risk of default on the asset, such as a loan and its implications are measured by the cost of replacing the default party cash flows. Thus, in order for banks to provide services such as loans to customers, there is a degree of uncertainty that the customers may default.

A research carried by the Bangladesh Bank (2005) showed that more than 50% of the total risk elements are in credit risk alone, making credit risk management the most crucial task in risk management arena. Other risk elements include market risk and operational risk (Reserve Bank of Zimbabwe, 2011). Market risk arises from the change in net asset value due to the changes in underlying economic factors such as interest rates, exchange rates, equity and commodity prices and operational risk (AL-Saati, 2002), whilst operational risk is the cost incurred resulting from inadequate or failed internal processes, people and systems or from external events, such as settlement failures and failures to meet regulatory requirements. Eva and Jaroslav (2012) claim that the global financial crisis arose due to the failure by credit risk managers in all financial systems to manage CR. Thus, a risk manager’s task is centred on optimising the amount of risk to capital.

2.5.1 Categories of Credit Risk

In order to determine the impact of ICTs on credit risk, there is need to identify and analyse the various categories of credit risk. Horcher (as cited in Zhao, 2007) identified six types of credit risk, and these include default risk, counterparty pre-
settlement risk, counterparty settlement risk, legal risk, country or sovereign risk and concentration risk.

Default risk can be defined as the risk that arises due to the outright refusal or failure by borrowing party to the contract to honour the contract terms (Raghavan, 2003). There are many reasons why such a risk may occur and this includes the liquidation, insolvency and/or bankruptcy of the other party or the decline of the credit worthiness of the borrower due to economic conditions. Thus, if there are measures in place to continuously monitor the borrower’s credit worthiness, loan recalls can be done before the borrower goes bankrupt.

Counterparty pre-settlement risk “is the risk of loss due to the counterparty’s failure to perform on an obligation during the life of the transaction” (Jorion, 2003, p.394). If the borrower fails to perform or make a payment as agreed in the contract it results in this type of risk. Zhao (2007) argues that it is the chance that the other party will default once a contract has been entered into but a settlement still does not occur.

Counterparty settlement risk is the risk that settlement may delay or fail to settle because of the different time zones or from the exchange of principal in different currencies during a short window(Jorion, 2003). Country risk just like any other counterparty risk is the risk that a country might fail to meet contract terms, thus a country might refuse to honour debt or might declare bankruptcy.

Concentration risk is the risk that arises from extending certain levels of credit to one industry, counterparty, region or a group of related entities or individuals (Reserve Bank of Zimbabwe, 2011). For example, if a bank extends credit to one
industry and that industry defaults, that bank will lose much of its funds since it had put more of its eggs in one basket. Thus most banks have in place various lending limits in order to reduce concentration risk.

This study is limited to Zimbabwe, thus it is not going to look at country risk. Emphasis of this research is limited to the procedures and processes carried out before the loan is issued or before funds are transferred from the bank to the borrower.

2.5.2 Credit Risk Management Process

Banks and financial institutions invest in various tools and procedures to protect themselves from any form of risk especially credit risk. Passenheim (2010) argues that the process of risk management should be continuous and must have a formal process for identification of credit weaknesses in place well in advance (Raghavan, 2003). Credit risk management starts when the clients fill out the loan application forms until the last loan repayment is made.

Auronen (as cited in Peterson & Bohman, 2008) argues that non-performing loans arise from information asymmetry problems. This is because it is difficult to distinguish between good and bad borrowers because of asymmetric problems, the bank not having enough information before the contract is entered into (adverse selection problem) and after the contract has been entered into (moral hazard problem) (Karlan & Zinman, 2006). Dowd (2009) believed that the moral hazard problem “played a central role in the events leading up to the crisis” (p.142). However, a study carried out by Karlan and Zinman (2006), claimed that information asymmetries are difficult to identify in practice than in theory after they carried out a research in South Africa (SA). Karlan and Zinman wanted to check
the existence of information asymmetry and its importance and they discovered that the default rate on loans caused by information asymmetry was between 7% and 16%. Thus, one can conclude that there are other factors that cause huge loan defaults other than information asymmetries.

H5: The use of ICT reduces Information Asymmetry (IA) that increases credit risk.

To effectively manage risk it is important that banks identify the potential risks first before they can exploit resources to manage them. The Bangladesh bank (2005) argues that CRM involves identification, measurement, matching mitigations, monitoring and control of the credit risk exposures (ISACA, 2008). Figure 2.4 shows how the risk management processes attributes are linked. Banks should ensure that their risk management processes must be able to identify potential risk factors, estimate the negative effects and put controls to reduce the potential risks (Peterson & Bohman, 2008).

As previously stated, ICTs help to integrate business processes effectively and efficiently, thus for a bank to minimise losses and earn an acceptable level of return for shareholders, it must invest in a robust ICT that will enable the risk managers perform all the risk management processes (Bangladesh bank, 2005). Raghavan (2003) suggested that risk parameters must be defined and the reviews must occur periodically because risks are static in nature. By regularly carrying out threat assessments, risks can be identified and mitigated effectively.
H2: ICT systems detect and reduce credit risk.

In a study carried out by Zhao (2007), it was revealed that traditional methods of credit risk management were still being used by British banks, and were still effective, and includes accurate loan pricing, credit rationing, credit limits, collateral and diversification. Some of these controls are also similar to those identified by Raghavan (2003) who classified them into six methods namely “exposure ceilings, review/renewal, risk rating model; risk based scientific pricing, portfolio management and loan review mechanism” (p.843). These risk control tools are going to be discussed in detail in the next section making reference to how ICT can enhance their effectiveness.
2.6 Integrating ICTs in CRM tools

2.6.1 Loan Pricing

The pricing of loans is critical when managing credit risk (Fatemi & Fooladi, 2006). One way used by banks to manage risk is by charging a risk premium in line with the client’s risk profile. This is meant to ensure that the bank recovers at least a greater part of the loan before the counter party starts to default. Raghavan (2003) argued that in order to come up with risk profile to be used on the counterparties, one needs to build historical data on default losses and this is where ICTs come in. Building loans historical data involves a lot of data processing and sometimes identifying the history that is most similar to the situation at hand might be next to impossible. Thus, ICTs can make this process simpler and much faster to handle with just one click of a button. ICTs thus help in processing all collected data and management information systems can then be used to produce reports on performance and predict future performance (Laudon & Laudon, 2009).

A research by Sen and Choudhary (2011) revealed that ICTs greatly reduce the costs of collecting, storing, processing, and disseminating information. It also assisted farmers in reducing costs associated with wrongly priced loans. These costs include the under estimation of risk profiles that may result in charging of low risk premiums or reworks that may arise from human error. Information systems will ensure pricing is done correctly first time without mistakes. This greatly assisted small scale farmers in managing risk.

H1: ICT systems in loan pricing reduces credit risk
2.6.2 Credit Rationing and Limits

Mishkin (as cited in Zhao, 2007) argues that credit rationing arises either by refusing to issue a loan to a borrower or restrict the quantity of the credit and this is done regardless of what the borrower is prepared to pay or how much the borrower wants. This is mainly done by banks to avoid concentration risk or when there are liquidity challenges in the market. In most instances, banks put credit limits (Jorion, 2003) and these include customer limits, industries limits, trader limits, rates limits and amount limits in order to reduce the credit exposure.

Since there are many limits to be controlled and observed, there are some trades or risks which may go unnoticed due to some rules or limits that may fail to pick breached limits. For example directors of a company may borrow funds as individuals and then borrow again using the company from the same bank, thus limits set may fail to detect this. However, there are some intelligent information systems which include expert systems, case-based reasoning, genetic algorithms, neural networks, fuzzy logic, and intelligent agents that can be used to detect this (Laudon & Laudon, 2009). Thus, ICTs can help to synchronise all loans and ensure that no limits are breached as well as reducing the extent of insider lending which may be toxic to the bank’s viability status.

H3: The uses of ICTs in managing credit limits reduce credit risk.
2.6.3 Collateral and Guarantees Ratings

It is now a norm that before one gets a loan from the bank one has to have collateral or a guarantee that will act as the bank’s fall-back position in the case of client default. According to Basel II, all guarantees have to be rated and can only be a company or a financial institution. In the RBZ Monetary Policy statement, Gono (2012) highlighted that there are no credit rating agencies in Zimbabwe and those available where international agencies that were very expensive, thus local banks were now relying on their own ratings. Thus, there is need for standard processes and procedures to rate customers and guarantees. One of the effective ways that banks can do this is to invest in ICT systems that will enable them to share loan information on their clients and their guarantees with other banks. Diniz, Pozzebon, Jaya and Araujo (2008) suggest that “ICT play a fundamental role in implementing and adjusting in-house credit score models and loan appraisal systems” (p.4). They were studying the role of ICT in improving Micro credit and they discovered that the availability of a powerful ICT infrastructure can be used to expand microfinance services offer. Using ICTs to share credit ratings information across the entire banking industry will go a long way in insuring all guarantees are correctly rated, reduce recovering costs and avoid defaulters with other banks to access loans with a different bank.

H4: ICT based credit rating models reduce credit risk.

2.6.4 Diversification

In order to control risks, banks can use diversification as a control mechanism (Gammoh, Voss, Fang & Xiang, 2010). This is where correlation of risk comes in,
where in one portfolio loans have to be negatively correlated in order to reduce systemic risk (Zhao, 2007). Thus, the loss of default from a certain industry or type of customers can be covered by cash flows from other negatively correlated loans and this will reduce the total loss if we combine all the loans in all the portfolios. Hence, using predefined thresholds will go a long way in reducing systemic risk and this can easily be implemented and maintained by ICTs. Whenever a loan is issued within a portfolio, the Information system should automatically calculate correlation of the new loan amongst the existing loans in the portfolio. ICT systems such as expect systems are able to repeat the same process over and over again without tiring and making mistakes (Laudon&Laudon, 2009).

2.7 How Basel II affects CRM

According to Gama and Geraldes (2012) the new Basel Capital Accord (Basel II) has changed the face of capital and money markets, which used to depend on external ratings. Under Basel II, banks can develop their own internal credit rating models to evaluate the credit worthiness of the borrowers, by so doing it reduces the information asymmetric problems between borrowers. By closely aligning capital with the modern risk management best practices, banks will be able to improve their risk assessment techniques (Tschemerjak, 2004). Tschemerjak (2004) argues that it is difficult for large banks to be fully Basel II compliant as they need to deal with issues pertaining to data gathering, architecture, and storage and data cleanup. This means that data collected should be accurate and complete for the new models to work. Having state of the art ICTs will not make a difference if the data stored in them is not reliable.

Risk assessment includes credit rating which involves the adding of a premium to the investment rate that depends on the perceived as risk of the particular borrower (Ketz, 2003). Butera and Faff (as cited in Gama &Geraldes,2012) argue
that banks are adopting new ICTs in order to implement new methods of credit risk management techniques in line with the Basel II. This is because the Basel II regulatory framework enables banks to invest in sophisticated credit risk management techniques (Gama & Geraldes, 2012). One advantage of using ICTs is that, they simplify the complicated methods and processes (Laudon & Laudon, 2009). ICT also enables banks to change their credit scoring models, this is because change is a continuous movement and the market is always changing (Leonard, 1996). Thus, banks that do not continuously invest and move ICTs changes, lag behind when it comes to adopting new and changing credit risk management tools that are in line with Basel II.

H6: Basel II requirements influence the investments in ICT based CRM tools to reduce credit risk.

2.8 Theoretical Framework

A theoretical framework guides one’s research, determining what things one needs to measure. According to Sekeran (2003), theoretical framework is a conceptual model of how one theorises or makes logical sense of the relationships among the several factors that have been identified as important to the problem. The framework discusses the interrelationships among the variables that are deemed to be integral to the dynamics of the situation being investigated.

Figure 2.5 is a schematic diagram that illustrates the researcher’s theoretical framework adapted for tackling this research. Research studies conducted by Dehlin and Olofsson (2008) suggest that ICTs may have a positive impact in business. As such, the ICTs need to be effective enough in order to work as pull factors to support the credit risk managing tools of banks and in turn reduce credit risk. Therefore, the ICTs are the independent variables, and CRM tools are the intervening variables. In this particular study, the moderate variables are the
impact of Information Asymmetry and Basel II whilst reduced credit risk is the dependent variable.

Figure 2.5 Theoretical Framework

From Figure 2.5 Information and Communication Technologies does not directly affect the rate of loan default, but rather the credit risk management tools. These CRM tools include loan pricing, credit rationing, credit limits and credit rating. The tools themselves are also affected by information asymmetry and the Basel II requirements. Thus, rate of loan default is influenced by the efficiency of ICTs in implementing the CRM tools.
2.9 Conclusion

This section has looked at various literature surrounding the use, evaluation and management issues involved in the use of ICTs in mitigating credit risk in banks. From the literature, it has been suggested that, when evaluating ICTs one can make use of either qualitative or quantitative method. The benefits of ICTs investments are difficult to measure because the ICT is dynamic and the benefits tend to be long term in nature. However, the evaluation process can be simplified if the purpose and the processes to be involved are clearly stated in advance. The types of credit risks and the CRM techniques were identified, and areas where ICTs can impact credit risk were discussed. These areas include loan pricing, credit rationing, credit limits and ensuring that all loans have collateral that is rated correctly. The last section that was discussed was how ICT is being used to enable banks to be Basel II compliant. However, for banks to be fully compliant with Basel II, they need to effectively manage data integrity through the use of robust ICTs. The framework that was developed for this research was also presented.
3.0 Introduction

This chapter presents the research methodology broken down into the research strategy, approach, design and methods used to address the research problem outlined in Chapter 1. Kumar (2005) defines research methodology as a procedural plan adopted by the researcher to answer research questions validly, objectively and economically.

Thus this section describes the research design, approach, the data collection instruments used and how data was analysed. Validity and reliability testing of the data collection questions and instruments used will also be described in this chapter, but firstly a brief overview of what the research intended to achieve will be presented. This view is shared by Cooper and Schindler (2006) who regard research methodology as the blueprint for the collection, measurement and analysis of data for research projects.

3.1 Recap of the Problem statement

Each and every bank in the Zimbabwe banking industry needs to determine how ICTs influence management in addressing the negative impact of credit risk. Like any other African country, the Zimbabwean economy is experiencing different economic conditions which affect the lending business and these include among others political and legal, economical, social and technological changes. Faced with the recent global financial crisis, the Capital Accord (Basel) which is on the agenda
of every central bank including Zimbabwe’s RBZ has changed the face of the banking industry as it mandates financial institutions to comply with regulation. To this end, financial institutions were given a leeway to use their own internal models to control credit risk. Basel allows banks to use sophisticated credit risk management tools and models, and literature has suggested that ICTs can help simplify this and thus, the need to evaluate the impact of ICT on CR.

3.2 Recap of the Study objectives

In order to evaluate and assess the impact of ICTs on CR, the research was split into various sub objectives with the first one being to evaluate the potential impact of utilising ICT systems on credit risk. The objective was to determine and quantify the potential benefits and limitations of ICTs in the banking industry and the economy as a whole. The second objective was to find out how banks are using ICTs to improve their efficiency and effectiveness when managing credit risk. The aim was to determine the tools used to manage credit risk and how ICT can improve efficiency and effectiveness of these tools. Other factors other than ICTs were also identified and the objective was to assess their impact on credit risk management and how ICT can alleviate. The fourth objective was to assess the role of ICTs in assisting banks to be fully Basel II compliant as required by the central bank. Recommend how best to evaluate and improve the effectiveness and efficiency of CRM systems.

3.3 Methodological Framework

3.3.1 Recap of Major Research Questions

The major research instrument used was the questionnaire and the research aimed to address the following research questions.
a) What is the potential impact of investing in ICTs when managing CR?
b) Are ICTs tools necessary to effectively manage credit risk in the banking industry?
c) What other factors affect CRM and how can ICT address resultant risk issues?
d) Are the local CRM techniques compliant with Basel II and how does ICT fit in?
e) How can a bank increase the efficiency and effectiveness of its CRM system?

3.3.2 Recap of the hypothesis

The research aim was to find out whether there is a relationship between ICTs and CRM tools in mitigating credit risk. The conclusion for this research, thus will accept that ICT is beneficial to credit risk management in improving loan repayments and reducing loan defaults if there is a relationship between ICT systems and credit risk tools.

3.3.3 Recap of the variables

The dependent variable being measured by this research is the rate of loan default and the independent variable is ICT. CRM tools which include loan pricing, credit rationing, credit limits, collateral and credit rating models are the intervening variables. The research also focused on other factors such as the new capital accord and information asymmetry which also affects credit risk.
3.3.4 Research Assumptions

The research mainly focused on the ICT (Information Systems) technology aspects and CRM tools, because all respondents use the same ICTs and CRM tools. The study assumed gender will not significantly affect the impact of ICTs on CRM tools. It was also assumed that the questionnaires were completed by the actual target respondent and the respondents provided accurate information, with all questions answered. After all respondents had completed their questionnaires, the researcher interviewed one senior manager of one bank. The assumption is the senior manager provided the researcher with the strategic impact which might not come out if the manager were to complete a questionnaire. The sample consisted of ten banks with the assumption that the ten banks are enough to represent the seventeen banks in the Zimbabwean banking industry (Gono, 2012).

3.3.5 Limitations

The response rate was one of the main obstacles in this research because there was no obligation or motivation for the respondents to respond. In order to increase the response rate, the questionnaire had short questions which were clearly and logically structured. Explanations were also provided to all respondents. This was done to clearly show the significance of the research so as to encourage participants to complete all the questions and provide accurate information. Most of the questionnaires were issued out using emails to respondents and a follow up was then made using email and some respondents were contacted using the phone. A few questionnaires were completed by the researcher on behalf of the respondent, to speed up the process and this increased the questionnaire respond rate.
This research also suffered from using a sample from people who had access to computers, this was because the research was centred on issues surrounding ICT. Although their number was insignificant, if there were to be included in the sample, they would have affected the dependent variables that were being tested. On the other hand, their inclusion would have caused outliers as these do not have access to ICTs. The ICT knowledge of the respondents was also another limitation, in some cases it was difficult for the respondents to comment accurately because of lack of knowledge; this is because exposure to sophisticated ICTs is still limited in Zimbabwe.

The research was only limited to Information Systems (IS), and excluded other aspects of ICTs which include hardware and network technology, management, organisational culture and people. This is because ICT is very broad and could not be covered within the stipulated research period.

3.4 Research Design

Burns and Grove (2003) suggest that a research design is a plan crafted to enable the researcher to have full control of all factors that may impact or affect the validity of the research findings. It shows how all the components of the research work together in order to achieve the research objectives (Trochim, 2006). The elements that the researcher had to control include sources of data, data collection tools and methods, how data is collected, processed and analysed. These elements are now going to be described in detail in the following sections.
3.4.1 Research Approach

Most studies carried out on the impact of ICT on businesses tend to use survey approaches (quantitative approach), this is because the survey approaches are normally adopted if one is carrying out large-scale gathering of evidence (Harness, 2009). The quantitative research approach was used for this study because the researcher prefers working with numbers. The quantitative approach also enabled the researcher to make use of questionnaires and reduced the risk of bias. Thus, some of the respondents completed the questionnaires in the comfort of their offices without the interference of the researcher. Hence, well thought responses were supplied. However, there was a high probability that some questionnaires were not completed by the intent respondent.

The deductive approach was used for this study because the reasoning generally followed a formal set of steps which is the top down approach (Trochim, 2006). Thus, in order to test the claim the researcher used reasoning methods in a formal logic way so as not to miss out critical factors that are important to the research under study.

3.4.2 Research Strategy

The survey strategy was adopted for this research, this was because the research was being carried out on many banks and the researcher could not analyse all the Zimbabwean banks within the stipulated time. Using a sample made it relatively easy to manage and it also simplified data analysis. For this study, the researcher used a sample of around one hundred participants and the target population was the Zimbabwean bank employees. Ten banks were randomly chosen and then ten questionnaires were sent to each bank. By randomly selecting the banks, reduced the researcher’s bias in order to ensure the objectivity of the research. Ten banks
were more than half of the current banks that are in the Zimbabwean banking industry. Thus, it was assumed every bank would have been represented from the chosen sample. The researcher made use of banking contacts to get access to respondents to be used for the research. This was done because the study was not looking for sensitive information hence there was no need to seek authorisation from the banks’ chief executive officers.

The researcher managed to interview one senior manager from one bank in order to ask for clarification on some of the data that was collected using questionnaires. This is what was suggested by Gray (2004), that interviews enable one to get highly personalised data, and ask for clarification because respondents will be able to use their mother tongue.

3.4.3 Unit of Analysis

The study aimed at analysing the impact of ICTs on Credit Risk. Emphasis was mainly on whether the efficient use of ICT systems can contribute towards the credit risk management function of the Zimbabwean banking industry. The aim was to analyse the effectiveness of the credit risk tools when banks fully utilise ICTs in reducing the rate of loan default. Thus, generalisations of this research will be made from evaluation of credit risk management systems used in the Zimbabwean banking industry.
3.4.4 Research Instrument

The instrument that was used for this research is questionnaire which was based on a five point Likert scale, which is similar to the questionnaire used by Somuyiwa and Adebayo (2011) who were investigating the ICT usage on logistics activities of manufacturing companies. The structure of the questionnaire and questions were adopted from the questionnaire that was used by Ismail and Masinge (2011) when they were looking at the factors influencing the adoption of mobile banking by the Base of the Pyramid (BOP) in South Africa. This instrument was used, because it consists of closed questions, fixed answers and scale response which made it easier for data analysis. Questionnaires were cheap to administer, and ensured considered responses.

The questionnaire had three sections, with the first section consisting of the demographic questions about the respondents. This included age, position and years of experience in the banking industry. This information was used to determine the quality of the information and knowledge of the areas under study. The second section consisted of Likert scale questions, where respondents had to choose from five options. The first few questions on the Likert scale were very simple and general with the aim of warming up the respondents showing the ease of completing the questionnaire. Questions pertaining to the research then followed and these were then classified according to the variables being tested. To enable the respondents to comment on the research study freely, open-ended questions were used.

The research also made use of secondary data sources which included bank’s financial reports, RBZ monetary policy statements and published journal articles. These data sources were used to determine the ICT investment appetites of the
banks, the value at risk in terms of the loans extended to clients and other factors that have been identified that affect CRM.

### 3.4.5 Pilot Study

A pilot study was carried out at one financial institution and this enabled the researcher to simulate the actual research. From the pilot study, the researcher was able to determine questions that were not clear to the respondents and the timeframe for both administering the questionnaires and getting the response from the target sample. The response rate was very high although there were some questions that were left out by the respondents. After making a follow up, it was discovered that the respondents left out the question because they did not know or the question was not clear. The questions were then rephrased before the study was carried out. Another observation that was made from the pilot study is that the respondents preferred a soft copy of the questionnaire to the hard copy because most of the questions involve just clicking the correct answer. Hence, the researcher made sure all respondents received both hard and softcopies of the questionnaire.

### 3.4.6 Population and Sample

The research targeted the Zimbabwean banks and it was looking at the banks’ employees that are involved in credit, credit risk or information systems that are used to issue credit or to manage credit risk. In order to simplify data collection and analysis, not all banks were used, only a sample was used in the research. Thus, simple random sampling method was used to select ten banks out of the seventeen banks presented by Gono(2012) in the RBZ Monetary Policy and then non probability sampling was used to select employees that were either risk officers, loan officers or ICT officers. 100 questionnaires were circulated, to each
bank. To select banks to be used, the names were written done on separate same size pieces of paper and placed in a hat. The papers were then picked up at random.

3.4.7 Administering the Research Instrument

The main research instrument that was used for the research was the questionnaire and interviews were then used to get further clarification on the information that was collected from the questionnaires. One hundred questionnaires were printed with labels and then hand delivered to all respondents in Harare. Soft copies of the questionnaires were then sent to the selected banks through the researcher contact persons for further distribution. A follow up was then made to the contact persons to ensure that they had received the questionnaires. The other tool used to administer the questionnaire was email (MS Office), which helped to ensure that all respondents had received questionnaires. The researcher used the read receipt tool on Microsoft Outlook which showed whether the respondents had read the email and it also reminded the respondents to complete the questionnaire.

The distribution of the questionnaires was done within two weeks. In order to reduce telephone costs, the researcher also made follow-up using VOIP and Skype. These made it easy for the researcher to communicate with the respondents cheaply and in some cases enabled the researcher to complete the questionnaire on behalf of the respondents.

3.5 Data Analysis
After collecting questionnaires from the respondents, the questionnaires were screened for errors first. Seven questionnaires were dropped out because the respondents had not completed most of the questions. However, about eleven questionnaires were included after the neutral check box was filled for them because they had one or two unanswered questions, as this would not have greatly affected the research findings.

Thereafter, data from the questions was then encoded into SPSS. In order to determine the reliability of the sub questions in addressing the main question, all questions were subjected to reliability testing. The next tests that were conducted were descriptive, checking on average how respondents viewed the impact of ICT on credit risk. The third test that was carried out was measures of dispersion in order to check where the respondents are clustered, through the use of standard deviation and variance analysis. To check whether there is a relationship between ICTs and CRM, the researcher used correlation testing, and this also assisted in determining the type of relationship and the strength of the relationship. To accept the claim that there is a relationship between ICT and CRM, the researcher carried out a hypothesis test to check the claim at 5% level of significance. 5% percent was chosen because it is the standard.

The data can also expressed as a regression equation and the following equation where used to determine ICT impact on credit risk management.

\[
\text{Loan Pricing} \quad i = \alpha_0 + \alpha_1 ICT
\]

\[
\text{Credit Rating Models} \quad \text{CRM} = \beta_0 + \beta_1 ICT
\]

\[
\text{Credit Limits} \quad \text{CL} = \mu_0 + \mu_1 ICT
\]

Where:
\( \alpha_0, \beta_0, \mu_0 \) is the constant which shows the impact on the dependent variables being tested in the absence of the ICTs.

\( \alpha_1, \beta_1, \mu_1 \) is the impact of the independent variable, in the presence of ICT.

### 3.6 Validity and Reliability

Pre-testing the data collection instrument was done to help in the identification and correction of problems with the research design. Trochim (2006) defines reliability as the consistency or repeatability of your measures, thus the data collection instrument should be able to produce the same results if the instrument is used on the same research again. To test for reliability of the instrument, after collecting the data from the first pilot study, the researcher gave the same respondents the same questionnaire after a week and a few changes we noticed. This showed that the instrument was reliable because the questions that were changed were those the respondents had initially left out. After asking why they answered them, the respondents claimed to have carried out their own researches.

To ensure validity, the researcher made use of the questions that were used by Somuyiwa and Adebayo (2011), who were analysing the impact of ICT on the logistics activities on the manufacturing industry. Some questions were then modified to suit the research under study and all questions originated from the research topic.
3.7 Ethics and Values

The data collection and analysis was carried out upholding these values: - Research respondents that participated in the research were not forced to participate and there was no form of identification on the questionnaire except for the questionnaire number. This assured privacy and eliminated the risk of victimisation. The research was general and was not looking for sensitive information, hence the researcher made use of contacts to get access to the respondents from the banks that were randomly selected for inclusion into the sample. Random sampling was used to ensure that the research be as objective as possible. The researcher did not temper with the data obtained from the research and data was analysed professionally.

3.8 Conclusion

The research methodology chapter showed how the researcher designed the methodology, how data was collected and analysed. Random sampling was used to select the banks to be incorporated into the sample. The main research instrument used to collect data was the questionnaire which was tested first for validity and reliability before the actual research was carried out. The quantitative data collection and analysis approach was used. After data was collected, the questionnaires were checked for errors before they were incorporated into the research. Several statistical tests were carried out on the data and these include correlation tests, hypothesis tests and regression analysis. The next chapter is going to present the finding from the data analysis and it is going to make use of statistical graphs.
CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.0 Introduction

This chapter presents the findings of the research. After analysis of the collected data, statistical graphs were used to present the results from the analysis made in the previous chapter. The results detail the issues surrounding the impact of ICT on Credit Risk, focusing on the objectives stated in chapter 1. To this end, the findings show whether ICTs play a crucial role in CRM in the Zimbabwean banking sector. Out of the 18 banks currently in the Zimbabwean economy, ten banks were randomly selected for this study.

4.1 Response Rate.

Table 4.1 Response rate

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Number of distributed questionnaires</th>
<th>Number of Returned questionnaires</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agribank</td>
<td>10</td>
<td>6</td>
<td>60%</td>
</tr>
<tr>
<td>Barclays</td>
<td>10</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td>Cabs</td>
<td>10</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td>CBZ</td>
<td>10</td>
<td>8</td>
<td>80%</td>
</tr>
<tr>
<td>Ecobank</td>
<td>10</td>
<td>7</td>
<td>70%</td>
</tr>
<tr>
<td>FBC</td>
<td>10</td>
<td>7</td>
<td>70%</td>
</tr>
<tr>
<td>Kingdom</td>
<td>10</td>
<td>6</td>
<td>60%</td>
</tr>
<tr>
<td>Metbank</td>
<td>10</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td>Stanbic</td>
<td>10</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td>ZBBank</td>
<td>10</td>
<td>8</td>
<td>80%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>61</td>
<td>61%</td>
</tr>
</tbody>
</table>
The questionnaire response rate was encouraging. Out of one hundred questionnaires that were circulated seventy two were returned and sixty one were found to be usable. Table 4.1 shows how the respondents responded and a success rate of 61% was recoded.

4.2 Reliability Level

After data was encoded into SPSS, the first test conducted was the reliability analysis and this was done to test the relationship between the individual items in the scale on each variable.

Table 4.2 Reliability Analysis

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Loan pricing</td>
<td>0.878</td>
<td>6</td>
<td>Very Good</td>
</tr>
<tr>
<td>H2</td>
<td>Credit Rationing</td>
<td>0.716</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>H3</td>
<td>Credit Limits</td>
<td>0.808</td>
<td>6</td>
<td>Very Good</td>
</tr>
<tr>
<td>H4</td>
<td>Credit Rating</td>
<td>0.799</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>H5</td>
<td>Information Asymmetry</td>
<td>0.766</td>
<td>2</td>
<td>Good</td>
</tr>
<tr>
<td>H6</td>
<td>Basel II</td>
<td>0.812</td>
<td>2</td>
<td>Very Good</td>
</tr>
<tr>
<td>H7</td>
<td>Cost of ICT Investment</td>
<td>0.893</td>
<td>3</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Most of the items or sub questions under each major question were adopted because the CBA value was between 0.7 and 0.95 suggested by Tavakol and Dennick(2011) for sub questions to be accepted. Items under Pricing of Loan had a CBA of 0.878 and Credit Limits had 0.808. However, three questions were removed out of the six that were initially asked to the respondents on the Credit Rationing section. Credit rating had six questions and only three questions were accepted because the responses on the other questions were not closely related to
each other. All items under Information Asymmetry, Basel II and the cost of ICT investments were accepted as is. Thus, one can conclude that the main questions were correctly subdivided and the items were closely related to each other in collecting the correct information.

4.3 Frequency Analysis

![Figure 4.1 Respondents per Department](image)

Out of the sixty one received questionnaires, the majority of the respondents were from the risk department as shown in Figure 4.1. Other respondents work in other departments which use credit systems or those that maintain the credit risk.
systems. This shows that the results will be objective because it includes mostly people who issue loans, maintain the credit risk systems and those that administer the credit risk tools. The researcher was able to obtain at least three managers from each department. Thus, both managerial and non-managerial responses were observed.

Figure 4.2 Age and Experience of the respondents

The aim of asking the respondents' age and experience was to determine the quality of information provided. Figure 4.2 shows that 21% of the respondents were 16-25 years old, 47% were 26-35 years old, and 36% were between 36-45 years whilst the remainder 6% respondents falling between 46-55 years. The results represent that the majority of the respondents are young and are mostly risk
takers. However, not many people have had much experience in the area being studied. Only nine people out of the sixty one have experience of more than ten years. However, this will not greatly affect the research as it is mainly looking at the period after the dollarisation and the younger generation prefers new ways of managing credit risk that are very easy to use as compared to the old generation which prefers methods that are manual and static. This was because not much had been happening in the lending business and most of the senior staff was either laid off, left the country during the economic meltdown for greener pastures and in some cases banks downsizing. An interview held with one of the senior risk manager provided these insights.

After comparing the respondent's job category and experience evidence shows that 78% of the respondents were non managers whilst the remainder 22% was managers. Managers are responsible for making decisions on ICT investments and loan authorisations. Non managerial staff are the ones that use ICT systems on a day to day basis and they are the ones who influence the policies and procedures to be changed. Thus, having the majority of participants being non managers will go a long way in testing the variables as they are mainly used by the non managers.

4.3.1 Loan Pricing

Loan pricing is an important aspect when issuing credit to customers and clients should be awarded correctly priced loans. Respondents were asked whether ICTs currently in use used in the pricing of loans help reduce credit risk and most of the respondents declined this notion. From Table 4.3, the mean score was around 2 and a low standard deviation of less than one showing the respondents were not in agreement with this notion. Although Fatemi and Fooladi (2006) argue that the
pricing of loans involves building a counter party risk profile in order to charge the appropriate risk premium.

Table 4.3 Improved Loan Pricing.

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Variation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan pricing procedures have greatly improved due to the investments in ICTs.</td>
<td>2.02</td>
<td>0.87</td>
<td>0.75</td>
<td>1.242</td>
</tr>
<tr>
<td>If ICTs can help minimise loan pricing reworks and mistakes.</td>
<td>3.85</td>
<td>0.95</td>
<td>0.90</td>
<td>-1.284</td>
</tr>
<tr>
<td>Loan authorisations decisions time has greatly reduced due to ICT investments since dollarisation.</td>
<td>1.69</td>
<td>0.62</td>
<td>0.39</td>
<td>.319</td>
</tr>
<tr>
<td>Loan pricing procedures are changed every time a new CRM system is implemented.</td>
<td>1.98</td>
<td>0.89</td>
<td>0.78</td>
<td>1.226</td>
</tr>
<tr>
<td>Loan pricing is system generated.</td>
<td>1.98</td>
<td>0.81</td>
<td>0.65</td>
<td>1.215</td>
</tr>
<tr>
<td>When the system calculates the loan price and the credit facility, I also confirm them manually.</td>
<td>2.31</td>
<td>0.83</td>
<td>0.69</td>
<td>-0.098</td>
</tr>
</tbody>
</table>

This works in an industry which is not facing liquidity challenges, in Zimbabwe the industry mainly uses standardised loan prices. Most banks do not use ICT systems when pricing loans, they only use it to build a counter party risk profile. All the
responses except for two, are positively skewed showing that the respondents do not agree that ICTs improves loan pricing. However, respondents agreed that banks can make use of ICTs to minimise loan pricing reworks and mistakes, as shown by the evidence with a mean score of 3.85.

4.3.2 Credit Rationing

An Information System is one of the tools used to detect and limit concentration risk arising from interparty relations. After asking how effective the Credit Information Systems are in detecting potential interparty relationships, 90% of the
respondents agreed with the notion whilst the remainder 10% was not sure. However, there were some issues that were raised by the respondents that ICTs should be fully automated in order to avoid some system overrides or manual interventions and all clients critical or mandatory information should be captured correctly in the database. Jorion (2003) also concurs and argues that it is difficult to detect whether a customer has breached a credit limit due to interparty relationships. Thus, the intelligent systems identified by Laudon and Laudon (2009) which are capable of identifying the relationships that might fail if the data is missing from the system completely. Zhao (2007) concurs that a loan application should be rejected regardless of one’s ability to repay loan if the limit is reached. Hence, this can only be achieved if the bank is fully automated and all data is available in the database.

4.3.3 Effectiveness of ICT Credit Limits

Table 4.4 ICT based limits

<table>
<thead>
<tr>
<th></th>
<th>The ICTs helps provide management with real time breached limits information.</th>
<th>ICTs are customised to suit the banks authorisation workflows.</th>
<th>Without ICTs, it is very difficult to enforce limits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.10</td>
<td>4.13</td>
<td>3.92</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>0.676</td>
<td>0.562</td>
<td>0.781</td>
</tr>
<tr>
<td>Variance</td>
<td>0.457</td>
<td>0.316</td>
<td>0.610</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.789</td>
<td>0.039</td>
<td>-0.940</td>
</tr>
</tbody>
</table>

Out of the 61 respondents, 39 agreed that ICTs it will be very difficult to enforce limits and the remainder 22 were either not sure or disagreed with the notion. A low standard deviation of 0.781 and a variance of 0.61 were obtained showing that the responses were very close to each other in agreeing with the notion after obtaining a mean of 3.92. As evident in Table 4.4, the respondents agreed that CRM
systems provide real time breached limits information and these systems can be customised to suit the banks authorisation workflows with mean scores of 4.10 and 4.13 respectively. Another observation that was made is that the responses were mostly negatively skewed, which confirm that respondents were in agreement with notion that ICT credit limits are effective.

4.3.4 Credit Rating

![Bar chart showing the agreement levels for the statement: The rating models currently in use are sophisticated and cannot be done without an information systems.]

Figure 4.4 Rating Models

All the respondents agreed that internal rating models were better than external rating models and these models were sophisticated. In order to determine whether
these models can be used without the aid of Information Systems, a mean score of 3.41 and a standard deviation of 1.023 were observed. Figure 4.4 shows respondents views, where 1=Strongly Disagree, 2=Disagree, 3=Not Sure, 4=Agree and 5= Strongly Agree. Thus one can conclude that on this aspect that the results were indifferent. It is therefore difficult to accept or deny that sophisticated models can be done without the aid of ICTs. The standard deviation to this question was very large, 1.023 and this indicates that the respondents responses where very different from each other.

Diniz et al. (2008) concur that ICTs play a crucial role in implementing and adjusting in house credit score models. Given that all the respondents agreed that their banks make use of internal rating models ICTs will go a long way in ensuring that these rating models are efficient.

4.3.5 Information Asymmetry

Figure 4.5 Information Asymmetry
There is always the risk that borrowers may fail to provide accurate or complete information, which is used to either rate the borrower correctly or request the correct collateral value. Respondents were asked whether ICT could reduce the risk of Information Asymmetry (IA) that causes loan defaults if borrowers have more information than the lenders and a mean score of 3.3 and a standard deviation of 1.022 were observed. This showed that one could neither accept nor deny that ICT cannot be used to reduce IA. When we considered the experience of the respondents, no conclusions could be drawn from the results as the experience is equally spread amongst the scale. Hence, the outcome confirms the claim made by Karlan and Zinman (2006) that information asymmetries are difficult to identify in practice than in theory.

4.3.6 Basel II Compliance

The new capital accord (Basel II), which is the current RBZ bank requirement which allows banks to adopt sophisticated credit risk management tools, was the next question. Respondents were asked whether ICTs play a crucial role in ensuring banks are Basel II compliant. Out of the 61 respondents, a mode of 4 was observed, thus 50.8% were in agreement and another 8.2% strongly agreed with the claim. 9.8% mainly from respondents from ICT were not sure whilst 28.8% disagreed with the impact of ICT. The experienced staff rejected the accession, this could be because they do not trust the information stored in the system. Some respondents argued that some systems were not capable of providing the simulations and testing required because the information was not available in the systems. This points out to what was suggested by Somuyiwa and Adebayo (2011) that businesses should have the technical expertise in place to help in assisting the users how to fully make use of the ICT systems. Thus, having a robust ICT system will not enhance the credit risk tools or models if users do not use them to their full capabilities.
In order to determine and justify ICT investments in CRM, respondents were asked whether the cost of ICT systems influences the investments made in Credit Risk Management systems. Figure 4.7 shows that most of the respondents were in agreement except for two people from ZB bank who disagreed and one person from FBC who was not sure. Woksepp and Olofsson (2006) concur that managers...
view ICT investments as expenses that consume resources and thus, in trying to reduce costs in turn reduces ICT investments. DAC(2004) explained why ICTs are expensive in countries such as Zimbabwe and argued that it is mostly because all technologies that needs to used must be imported and subject to costs such as license fees and implementaion costs. DAC also argued that connectivity costs are very high in developing countries compared to developed countries and this makes the investments in ICTs out of reach for many banks and thus making it difficult to justify.

Figure 4.7 ICT Investment Cost
Statistical test shown in Appendix B shows Analysis of Variation (ANOVA) results and evidence did not support the following hypotheses at 5% significance because their P values were greater than 0.05.

i) ICT systems in loan pricing,
ii) ICT based credit ratings reduce credit risk and
iii) ICTs help reduce IA that increases credit risk.

The results, however, supported the following hypotheses at 5% significance with P values less than 0.05.

i) ICTs assist in reducing credit risk if they are used to manage credit limits,
ii) ICTs help in the identification of potential inter-party risks and
iii) Basel II requirements and the perceived cost of ICTs influence the adoption of ICTs in CRM.

4.6 Conclusion

Evidence collected from the research was presented in this chapter. Statistical tables and graphs were used to present the results. Explanations were also provided on the data that was presented. Hypothesis testing was also conducted on the research and out of the seven hypotheses that were tested, the evidence only supported five. The next chapter will present the conclusion and provide management with recommendations that will assist banks in reducing credit risk through the effective and efficient use of ICT systems.
CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

After collecting and analysing the research findings shown in the previous chapter, this is the final chapter which presents the conclusions and recommendations on the impact of ICTs on credit risk management in mitigating credit risk. This chapter will also present recommendations and policy changes that bank managers may consider in order to fully reduce credit risk through the use of ICTs.

5.1 Empirical Evidence

The major contributions of this research are as follows:

5.1.1 Loan Pricing Decisions

Evidence collected showed that ICTs do not help in the pricing of loans. The study revealed that standard market prices are used to price loans after adding administration costs. Thus, from a Zimbabwean context, pricing a loan on the basis of charging a risk premium generated by a computer system, does not apply. The study confirmed that intelligent systems can be used to process and speed up decisions that involve building the borrowers’ risk profile more effectively and efficiently.
5.1.2 Data Integrity

The evidence gathered during the research pointed out that ICTs have a positive impact when managing concentration risk that causes credit risk. This can only be done if all the information is accurate and is stored in the system. It is therefore important to ensure users trust their Information Systems and the data stored in them. The study noted that Expert systems such as fuzzy logic and generic algorithms, can be used to come up with inter relationships between parties, inter group parties and in some cases process incomplete information and make it complete if the information is missing. Thus, banks can make use of expert systems to detect and assess inter-party relations when assessing the party credit limits in order to reduce credit risk.

5.1.3 Credit Limits

The study also revealed that ICTs make it easy to create, control and maintain credit limits. This is because ICTs are customisable and user friendly which makes them very easy to customise to suit loan processing work flows. Thus, it will be difficult for unauthorised loans to be issued without being detected. ICTs can be used to implement complicated limits that may go undetected if they are done manually.

5.1.4 Change Management

A notable outcome from the study was that there is some form of resistance in some banks where staff are not fully utilising ICTs, thus, evidence showed that most banks tend not to change their processes and procedures when they acquire new systems. The processes in place involve a lot of manual interventions that are prone to mistakes and render information systems not effective. Most calculations...
produced by systems are then added some user discretions which are sometimes good or bad. Thus, in order for banks to fully utilise ICTs, they need to change the processes and procedures in place so as to fully utilise the ICT capabilities.

5.1.5 Challenges and Implications of ICT based CRM systems

It was evident that all respondents concurred that ICTs are dynamic and new technology is now produced frequently. The research established that the Banking regulations are also changing and when the economy was dollarised the central bank was mainly focusing on a few aspects of the Basel II such as the Risk Weighted Assets. This has since changed and banks are now supposed to be fully Basel II compliant. Thus, there is need for continuous user training on both CRM tools and ICT systems. Banks must ensure that they collect as much information as possible from their clients, even if the information might not be mandatory on the system, but when it comes to Basel II requirements it is required.

5.1.6 ICT Costs

The research has also established a very strong economical linkage on ICT projects in the banking sector. Faced with the Basel II requirements that banks need to have a Credit Management System in place, banks are mainly considering the cost of the systems because of the cost associated with ICTs. As a result of this strong relationship, it can be concluded that most ICT investments are made with rough estimates of their costs and benefits and as such bank managers should ensure that they carry out proof of concepts tests on all systems before they acquire or upgrade ICT systems.
5.1.7 Ratings

Most of the customers and collaterals are not correctly rated because there are no rating agencies in Zimbabwe. From the research, banks do not share information with other counter parties and this increases the risk of issuing loans based on inadequate collateral or to underserving customers. Evidence did not support that ICTs can be used to enhance customers or guarantee ratings used to reduce credit risk.

5.2 Research Hypothesis Validation

Statistical tests did not support the hypotheses that ICT systems in loan pricing and ICT based credit ratings reduce credit risk. It also declined the notion that ICT helps reduce Information Asymmetry that increases credit risk. Evidence, however, supported that ICTs are likely to assist in reducing credit risk if they are used to manage credit limits and in the identification of potential inter-party risk. Basel II requirements and the perceived cost of ICTs were also supported as both likely to influence the adoption of ICTs in CRM.

From the statistical tests one can conclude that Zimbabwean banks should invest in ICTs when managing credit risk because it reduces credit risk. It reduces risk by managing credit limits, identifying potential inter-party relationships and investing in ICTs is influenced by the cost of ICTs and the need for banks to be Basel II compliant.
5.3 Methodological Contribution

Investigating impact of ICT on credit risk management involves studying two separate fields which are ICT and Credit Risk. In order to fully understand and evaluate the impact of ICT there is need to analyse the known benefits of ICT and then evaluate whether these are the same when managing credit risk. The other dimension is understanding the credit risk management process and look for where ICT can come in to alleviate some of the inherent risks or shortcomings of the process involved. Thus, it must be clear from the beginning which approach is being taken.

Another observation made was reliability of the sub questions which should be done during the pilot study. The pilot study should include two or more banks, if one is studying more than five banks. Doing this at the pilot testing phase, enables all the questions to be tested and then considered during statistical analysis. To speed up data analysis, the questions must be group per concept or variable being tested. Variable need to be drawn from the objectives of the research, this simplifies data analysis and conclusions.

5.4 Policy Recommendation

User training is vital to the success of every Information system. Banks should make it mandatory to train all system users at least once a year. This will help change the attitude of the employees and enable them to fully utilise the Information Systems. Evidence also show that banks do not share clients information, since there are no rating agencies in Zimbabwe banks should consider changing this policy. Sharing of this information will help reduce systemic risk which affects and cripple the whole banking industry if another counter party issues
a loan to a party without enough information or all banks issuing loans to one risky party.

5.5 Managerial Recommendations

ICTs are dynamic and difficult to evaluate. Thus, after acquiring an InformationSystem, users must quickly test and implement the system before technology changes. This will enable the banks to make use of the first mover advantages before other players come in.

When it comes to the pricing of loans, the price of the loan should be produced by computer systems after it has analysed the party risk profile not just issuing a standard price to all parties. Management should ensure that the CRM system is fully automated and must eliminate all human intervention. This reduces human error, increases efficiency and ensures data integrity.

Ensuring data stored in the system is not a once of project or event, it must be an ongoing process. Customers’ information, risk profiles and inter-party relationships are always changing hence there is need to continuously update the system knowledge base so that credit management systems have up to date and complete customer data.

5.6 Generalisation

The finding of this research can be generalised because the research included big banks such as (CBZ, Stanbic) and small banks such as Metbank (Gono, 2012). It also included regional banks, Stanbic owned by the Standard Bank Group of South
Africa, Ecobank owned by the pan-African bank and Cabs, Old Mutual Zimbabwe and local banks such as CBZ, FBC, ZB Bank, Metbank and Kingdom bank.

5.7 Areas for Further Research

As much as the research has shown the costs and benefits associated with credit risk management systems on the Zimbabwean banking industry, there is need for extending this research in other industries such as Micro finance firms that issue credit to their customers. Further studies can be carried out on quantifying the actual benefits and costs associated with ICT base CRM systems. Banks are exposed due to loans extended to their shareholders, directors and staff, hence the need to study the suitability of ICTs in managing these.
BIBLIOGRAPHY


DCD. (2004). *ICTs and Economic Growth in Developing Countries*. DCD/DAC/POVNET.


Impact of ICT on Credit Risk Management (CRM) in Zimbabwean Banks

Questionnaire

Once completed, please send the questionnaire directly to tchinomona@datacentre.co.zw

- The responses in this questionnaire are private and confidential. Only the research consultants have access to completed questionnaires.
• Please ensure that you email your questionnaire directly to the above email ONLY

This study is meant to evaluate the impact of Information and Communication Technology on CRM in relation to the issues identified in each question. Most response options range from low to high in agreement.

Most response options range from no extent to very large extent.

Instructions
1. Indicate your response by ticking the box corresponding with your answer.
2. Where you need to type in your response please click the grey area and type in your response.
3. For Questions 1 up to 45 please tick ONLY ONE box that corresponds with your opinion. You may tick by simply clicking on your preferred response.
4. If the response options do not provide a perfect fit for your unique situation use your best judgment.
5. Please complete the demographics section below first

<table>
<thead>
<tr>
<th>Name Bank (e.g. CBZ, FBC):</th>
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<tbody>
<tr>
<td>Name of Department (e.g. ICT, Retail, Risk):</td>
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<td>Job Category: Managerial □ Non-Managerial □</td>
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<td>Gender: Male □ Female □</td>
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<td>Highest Academic Qualification:</td>
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<td>Experience in this Org (e.g. 5 yrs):</td>
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**Pricing of Loans**
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<tr>
<th></th>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<tbody>
<tr>
<td>13</td>
<td>ICTs help minimise loan pricing reworks and mistakes.</td>
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<td>Loan authorisations decisions time has greatly reduced due to ICT investments since dollarisation.</td>
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<td>Loan pricing procedures are changed every time a new CRM system is implemented.</td>
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<td>Loan pricing is system generated.</td>
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<td>When the system calculates the loan price and the credit facility, I also confirm them manually.</td>
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**Credit Rationing & Limits**

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<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<tbody>
<tr>
<td>18</td>
<td>In order to control dealers and loan officers, the bank makes use of ICT based trader limits</td>
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<td>The ICTs helps provide management with real time breached limits information.</td>
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<td>20</td>
<td>All limits are soft and ICTs enable real time authorisation.</td>
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<td>21</td>
<td>ICTs are customised to suit the banks authorisation workflows.</td>
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<td>22</td>
<td>Without ICTs, it is very difficult to enforce limits.</td>
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<td>Credit Information Systems are effective in detecting potential inter party relationships.</td>
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<td>24</td>
<td>Information systems reduce time spend in detecting inter party relationships before a loan is issued.</td>
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<td>It is easy to determine inter-party relationships when all the customer information is readily available.</td>
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### Credit Rating Models

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<td>26</td>
<td>The bank uses internal customer, guarantees rating models</td>
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<td>27</td>
<td>ICT systems play a crucial role in the rating credit models</td>
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<td>Rating customers and collateral through CRM systems does not require a lot of mental effort.</td>
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<td>29</td>
<td>The rating models currently in use are sophisticated and cannot be done without an information systems</td>
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<td>Customer credit risk profiles that are generated by computer systems are effective.</td>
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<td>31</td>
<td>I trust the Ratings and risk profiles produced by our Information Systems.</td>
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### Information Systems and Credit Risk

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<tr>
<td>32</td>
<td>The bank is fully Basel II compliant</td>
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<td>33</td>
<td>ICT plays a crucial role in ensuring the bank is BII compliant</td>
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<td>The bank uses similar CRM systems to those used by other banks</td>
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<td>The bank shares information with other banks pertaining to risky clients</td>
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<td>36</td>
<td>All ICT investments are evaluated within a year after being implemented</td>
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<td>The evaluation of CRM systems is planned and the all stakeholders are involved.</td>
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<td>The evaluation of information systems is fair and transparent</td>
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<td>The CRM system is user friendly and simple to operate.</td>
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<td>Loan defaults usually result from Information Asymmetry</td>
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<td>ICT cannot be used to reduce Information Asymmetry</td>
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<td>CRM systems reduces operating costs</td>
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<td>CRM systems help keep track status of customer’s information and loans.</td>
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<td>Overall, I think ICTs enhance processes used in managing credit risk.</td>
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<td>ICT based CRM systems creates new jobs.</td>
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What are the things you like least about the CRM system currently in use?
What are the things you consider important when evaluating a CRM system?
(List in order of priority, starting with the most important)

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ANY OTHER COMMENTS

Thank you for participating in this research. When you have completed questionnaire
please SAVE and ATTACH to your mail and send!
# APPENDIX B

## HYPOTHESES RESULTS SUMMARY

<table>
<thead>
<tr>
<th>Item</th>
<th>Hypotheses</th>
<th>Evaluation</th>
<th>Reason</th>
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<tbody>
<tr>
<td>H1</td>
<td>ICT systems in loan pricing reduces credit risk</td>
<td>Not Supported</td>
<td>ANOVA Result: F value = 0.242, P value = 0.624, Alpha = 0.05</td>
</tr>
<tr>
<td>H2</td>
<td>ICT systems detect and reduce credit risk.</td>
<td>Supported</td>
<td>ANOVA Result: F value = 4.176, P value = 0.045, Alpha = 0.05</td>
</tr>
<tr>
<td>H3</td>
<td>The uses of ICTs in managing credit limits reduce credit risk.</td>
<td>Supported</td>
<td>ANOVA Result: F value = 3.417, P value = 0.007, Alpha = 0.05</td>
</tr>
<tr>
<td>H4</td>
<td>ICT based credit rating models reduce credit risk.</td>
<td>Not Supported</td>
<td>ANOVA results, F value = 0.534, P value = 0.468, Alpha = 0.05</td>
</tr>
<tr>
<td>H5</td>
<td>The use of ICT reduces Information Asymmetry (IA) that increases credit risk.</td>
<td>Not Supported</td>
<td>ANOVA Result: F value = 1.08, P value = 0.341, Alpha = 0.05</td>
</tr>
<tr>
<td>H6</td>
<td>Basel II requirements influence the investments in ICT based CRM tools to reduce credit risk.</td>
<td>Supported</td>
<td>ANOVA Result: F value = 12.04, P value = 0.001, Alpha = 0.05</td>
</tr>
<tr>
<td>H7</td>
<td>The perceived cost of ICT investments increases the adoption of ICTs to reduce credit risk.</td>
<td>Supported</td>
<td>ANOVA Result: F value = 14.004, P value = 0.0001, Alpha = 0.05</td>
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