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THE IMPACT OF OPERATIONAL RISK ON PERFOMANCE OF MICROFINANCE INSTITUTIONS IN ZIMBABWE (2000-2023)

BY

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APPROVAL FORM

I Nancy Pitori, do hereby declare that this submission is my work apart from the references of other people's work which has been acknowledged. I hereby declare that this work has neither been presented in whole nor in partial for any degree at this university.

Signature of student   date 10/06/24

Signature of supervisor   date.11/06/2024

Signature of chairperson   date. 11/06/2024

DEDICATION

 I dedicate this project to my beloved family and friends for their passionate efforts and emotional and financial support.

ABSTRACT

This study investigates the impact of operational risk on microfinance institutions (MFIs) in Zimbabwe. Focusing on KCI microfinance, the research examined data from three KCI branches between 2000 and 2023. In this study, regression analysis was employed to assess how operational factors affect financial performance. The study considered performance as KCI's return on assets (ROA) and operational risk through factors like cost-to-income ratio, operating expense ratio, and operational efficiency ratio. Research findings revealed both positive and negative relationships between operational factors and financial performance. A positive correlation emerged between operational efficiency and ROA, indicating efficient operations contribute to profitability. Conversely, cost-to-income ratio, operating expense ratio, interest rates, exchange rates, and inflation rates all exhibited a negative association with ROA, suggesting they hinder financial performance. In conclusion findings revealed a significant negative influence of operational risk on MFI profitability. High staff costs associated with organizational management appear to be a key delinquent. Based on these findings, the study suggests that Zimbabwean MFIs should prioritize adopting and improving information and communication technologies (ICT) alongside management systems that minimize staff expenses and overhead costs. This focus on operational efficiency can lead to improved financial performance.

ACKNOWLEDGEMENTS

Contents

FIGURES

ABBREVIATIONS

KCI-Kenneth Consultant International

ROA-Return on Asset

CIR-Cost to Income Ratio

OER-Operating Expense Ratio

OPER-Operational Efficiency Ratio

MFI-Microfinance Institution

CHAPTER 1

1.0 INTRODUCTION

The growth and development of the economy heavily depends on the microfinance sector. The biggest obstacle for Zimbabwean microfinance is operational risk. Operational risk can be classified into two categories: (1) loss resulting from technology/system failure within the company, such as internal procedures and transactions; or (2) loss resulting from agency costs, such as fraud and poor management (Jarrow 2006). Michael Pinedo described operational risk, according to Yuqian Xu, as the possibility of a loss as a result of either external occurrences or insufficient or unsuccessful internal procedures, people, or systems.

1.1 BACKGROUND

Researchers in the financial sector and government agencies have begun to concentrate particularly on operational risk within the sector and in government agencies .Cruz (2010) gives an introduction of mathematical and statistical methods that can be used in a variety of settings and talks about statistical methods for calculating operational risk. According to Scharfman (2012), the best defence against operational risks is to implement a robust and creative operational due diligence review programme. Operational risk requires capital under the New Basel Capital Accord, which also pushes financial institutions to evaluate and manage this kind of risk more precisely. The purpose of this study to find the techniques that can be used, including loss distribution methodology, control self-assessment, scenario analysis, and key risk indicators.

Chernobai et al. (2012) offer a concise synopsis of key statitical research grounded in actual operational loss data and address pertinent theoretical underpinnings, thereby furnishing a thorough and current set of useful instruments for operational risk modelling. Insider fraud, rogue trading, and accounting scandals that resulted in significant operating losses have drawn increased attention from the public, media, and policymakers (Galloppo, 2011). Financial services companies are now aware of this third category of risk, which is becoming just as important as market and credit risk. Barclays 2014 Annual Report points out that operational risk accountsfor 9% of the bank's overall risk exposure (Apergis, October 19, 2016).

Over the last ten years, there have been a number of significant operational risk events. These include fraudulent actions by companies like Barclays and Lloyd Banking Group in 2006, which resulted in losses of 5.9 billion and 4 billion, respectively, and Bernard L. Madoff Investments securities in 2008, which caused losses of 17 billion and 6.3 billion, respectively. These events demonstrate that even financial institutions with ostensibly complex risk management systems are susceptible to significant operational loss events (Apergis, 19 October 2016).

According to Shahzad's 2019 theory, poor operational risk management is the main reason for a lot of microfinance failures, which can result in significant losses and even bankruptcies. In addition, credit quality is seen to be a good indicator of microfinance's operational and financial health. The country's financial system is crucial to its overall health and primarily depends on a strong banking system (Das & Ghosh 2012). If the system fails, it could impede the nation's economic progress (Abhiman & Sabil 2011). As a result, operational risks in microfinance should be reorganised as major challenges to their performance and handled as precisely and effectively as possible.

Microfinance faces Operational Risk as well as Credit Risk. Microfinance institutions (MFIs) navigate a dual risk landscape, which are credit risk and operational risk (Gadzo et al., 2019). Credit risk stems from borrower defaults, while operational risk encompasses internal weaknesses and external disruptions. Operational Risks in Microfinance are Internal Issues. Inadequate systems, procedures, and internal fraud can lead to losses, External Events, workplace safety hazards, legal disputes surrounding products or practices, and physical damage to assets can all disrupt operations. Disruptions, business interruptions, system malfunctions, and faulty processes can hinder performance.

Research by Goyal & Agrawal (2010) highlights the diverse hazards impacting microfinance operations. Furthermore, Gadzo et al. (2018) emphasize the significance of operational risk, given that credit management makes up over 75% of microfinance assets. Fadun and Oyen (2020) point to concerns from regulators and management regarding rising losses due to inadequate operational risk management. This ultimately affects overall financial performance. Saiful and Ayu (2019) and Kamirwa and Katherine (2019) further highlight the resulting anxieties about financial system stability and the need for more frequent bank examinations. In conclusion, effective operational risk management is thus a crucial pillar for the success ofl microfinance operations.

1.2 PROBLEM STATEMENT

Operational risk poses serious problems to microfinance institutions since it can result in increased expenses, decreased earnings, and harm to one's reputation. A number of microfinance institutions in Zimbabwe collapsed between 2000 and 2009 as a result of difficult economic conditions. Because operational risk was not identified in time to avert such organizational life-threatening conditions, microfinance was affected by it. It is evident from earlier studies that, in spite of the abundance of research on risks impacting microfinance, relatively little has been done to evaluate operational risk in order to determine the extent to which it affects microfinance performance in Zimbabwe. This study used a regression model to investigate the impact of operational risk on microfinance performance in an effort to close the lack of comprehensive understanding about the impact of operational risk on microfinance performance. Even though microfinance has been hailed for its ability to empower people and spur economic progress, operational risks have a big influence on how well microfinance firms function. The purpose of this study is to determine how much operational risk affects key performance indicators in the microfinance sector, including profitability, efficiency, and growth.

This problem statement specifies the location (microfinance institutions), the desired objective (understanding the relationship between operational risks and performance indicators), and the issue (operational risks effecting performance).

1.3 RESEARCH OBJECTIVES

The objectives of this study are:

1. To examine the impact of operational risk on performance of microfinance.

2. To explore strategies to mitigate the impact of operational risk on performance of microfinance.

3. To determine the relationship between operational risk and operational performance

4. To determine the correlation between operational risk and financial performance

5. To develop a model to predict financial performance based on operational risk factors

1.4 AIMS

(a) To develop a statistical model to assess the impact of operational risk on the financial performance of microfinance institutions, with the objective of identifying improved strategies for the prevention and management of operational risk

(b) Examine the relationship between operational risk and performance; use the relevant statistical methods to look into how operational risk affects a microfinance institution's performance.

(c) Analyze historical data from microfinance institutions and looking at the relat ionship between performance metrics and operational risk indicators may be necessary to achieve this, make suggestions for enhancing performance and controlling operational risk; in light of my research, offer useful advice to microfinance institutions wishing to improve their performance.

1.5 SIGNIFICANCE OF THE STUDY

The study took into account the significance of microfinance institutions. The operational risk management problem requires immediate attention from microfinance's operation managers, finance managers, branch managers, credit managers, and board members. The results of this study will assist those involved in microfinance in managing their institutions more effectively. This study will aid in the understanding and management of operational risk in microfinance. It can assist in averting or lessening the effects of possible occurrences that might result in monetary losses or harm to one's reputation. The report sheds light on the opportunities and difficulties microfinance institutions have when it comes to managing operational risk and how that impact affects their bottom line.

A microfinance institution's ability to remain financially sustainable may be directly impacted by operational risk. Operational risk can result in monetary losses, higher expenses, and interruptions to operations when it manifests. This may negatively impact microfinance's financial performance, limiting its capacity to turn a profit and continue to be viable over the long run. In order to provide financial services to the underprivileged and economically disadvantaged population, microfinance is essential. The way that operational risk affects microfinance performance can have an impact on how well certain populations are reached and served. Inadequate management of operational risk can impede the delivery of prompt and dependable financial services and restrict credit availability.

In the microfinance industry, operational risk may also have an impact on regulatory compliance. Regulations have been put in place in several nations to guarantee the stability and soundness of microfinance. Ineffective risk management during operations can result in noncompliance with regulations, putting microfinance institutions at risk of fines, harm to their reputation, and even liquidation. Operational risk affects microfinance companies' reputation and brand image in addition to their performance. Client confidence can be eroded by operational errors such system outages, data breaches, or improper handling of client information. Microfinance must uphold a solid reputation in order to draw in new business, keep existing clients, get funding, and form alliances with other players in the financial system.

1.6 RESEARCH QUESTIONs

(a)What is the relationship between operational risk and financial performance ?

(b)Is there a significant correlation between operational risk and financial performance metrics in microfinance institution(KCI)?

(c)Can operational risk factors predict financial performance in microfinance institution(KCI)?

1.7 SCOPE OF STUDY

To develop a statistical model to assess the impact of operational risk on the financial performance of microfinance institutions, with the objective of identifying improved strategies for the prevention and management of operational risk is the aim of the study.The study utilize data from the KCI microfinance during the period of 2000 to 2023.R studio was used for statistical analysis. Descriptive statistics, inferential statistics and multiple regression analysis were the statistical techniques employed in this study. Additionally, the study analyze various determinants that are crucial for assessing the impact of operational risk on the financial performance of microfinance institutions. The determinants of this study include Return on Asset, Cost to Income Ratio, Operating Expenses Ratio, Operational Efficiency Ratio, Interest Rate, Exchange Rate and Inflation Rate. This study utilized the quantitative data.

1.8 LIMITATION OF THE STUDY

It's possible that the study won't be able to control variables that impact microfinance performance. The effects of operational risk can differ significantly amongst microfinance products. Data about operational risk occurrences and their effects on microfinance may be infinitely available.

Operational risk is a broad term that includes a number of internal variables. In the context of microfinance, operational risk measurement and quantification can be challenging. It may be difficult to determine how operational risk affects microfinance performance since current frameworks and indicators do not adequately account for the particular operational risks that the industry faces.

The size, target audience, legal structure, and geographic location of microfinance vary greatly. Examining how operational risk affects microfinance success necessitates taking this variability into account. Nonetheless, it can be difficult to encompass all of the varied aspects of microfinance in a single study, and the findings' applicability to other kinds of microfinance branches may be restricted.

1.9 ASSUMPTIONS

- The study assumes that operational risk is a significant risk factor that can impact the financial performance of microfinance institutions.

- The study assumes that the data collected on operational risk and financial performance is accurate and reliable.

-The study assumes that the sample of microfinance branches selected is a representative of the larger population of microfinance institutions.

1.10 DEFINITION OF TERMS

MICROFINANCE

A type of financial services known as is intended primarily for low-income individuals and those underserved by regular financial institutions. It offers a variety of goods and services, including insurance, savings accounts, and minor loans.

OPERATIONAL RISK

Op is defined by the Basel Committee on Banking Supervision as the risk of loss arising from insufficient or malfunctioning internal processes, people, and systems, or external events (BIS 2006). Operational risks come from mishandled processes, policies, or systems, including staff mistakes, system malfunctions, fraud, other illegal behavior, and any incident that tampers with business operations, according to BBCS (2017). These occurrences could result in operational losses linked to a breakdown in internal controls or a disregard for established protocols. Operational risk therefore results in operational losses, which are the cost to microfinance. Stakeholders may experience uneven performance and earnings if operational risk is not methodically addressed (BCBS, 2014).

OPERATIONAL RISK MANAGEMENT

Operational risk management (Leonard 2016) is a process of recognizing, evaluating, tracking, and managing operational risk .The definition of operational risk management is a continuous, cyclical process that involves risk assessment, risk decision-making, and the application of risk controls, all of which lead to acceptance and mitigation of the risk. The supervision of operational risk, which includes the possibility of loss from insufficient or malfunctioning internal processes and systems, human error, or outside events, is known as operational risk management. The term "microfinance performance" describes how well a business uses its resources, primarily its basic assets, to generate profits (Magnifique 2011).Determining the operational outcomes and overall financial health of microfinance services are some of the reasons we assess the performance of microfinance. (Kmandea, 2016)

FINANCIAL PERFORMANCE

.Financial performance is defined as its capacity to create new resources from its regular business operations over a specific time period.

CONCLUSION

In conclusion the research has highlighted the need for comprehensive risk management strategies that encompass robust internal controls, effective governance structures and proactive risk identification and mitigation measures. By acknowledging the intricate relationship between operational risk and the performance of microfinance institutions stakeholders can implement targeted strategies to enhance operational efficiency, minimize risk exposure and ultimately improve overall performance.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter examines earlier research projects conducted by academics and researchers. The theoretical literature, empirical literature, research gap, and suggested conceptual model are all analysed. In order to establish an appropriate research methodology that will subsequently enable the resolution of the discovered research gaps in the next chapters, this part aims to assist the research in identifying deep-rooted research gaps at each level of the research objective. This section examines the associated ideas in depth to create a concise overview of the topic being studied.

2.1 Theoretical Literature

2.1.1 Extreme value theory

Embrechts developed this theory in 1999.It looks at the values that are farthest away from the typical or middle values in a data set. Based on a specific request test of an arbitrary variable, Extreme Value Theory suggests that events may occur that are more absorbent than those that have already been seen (Bundi 2021).This theory looks into the knowledge of operational risk management in relation to the sensitivity of known hazards and the different risk transfer strategies put in place to keep things running smoothly. Extreme Value Theory postulates that a financial institution's exposure to market risk is less variable when operational risk is internal and only more volatile when operational risk is external (Richard Ngali, 2021).

 Extreme value theory offers a strong theoretical framework for creating statistical models that explain extreme occurrences in financial institution operations. By emphasizing risk securitization and alternative risk transfer, extreme value theory advances our knowledge of operational risk in financial institutions. Extreme value theory is a key methodological component of risk management for financial institutions like microfinance banks. As a result, when evaluating how operational risk management techniques affect the financial performance of microfinance, extreme value theory is essential. (Ngali Richard, 2021).

2.1.2 Information asymmetry theory

When borrowers know more about the microfinance institution than the institution knows about them, there is an information asymmetry. Adverse selection and moral hazard are two issues that may arise from this. The possibility that borrowers will act against the lender's best interests because they lack complete knowledge of the lender's risk tolerance is known as

moral hazard. Conversely, adverse selection refers to the possibility that borrowers who have a greater likelihood of defaulting may request for loans more frequently because they are more aware of their creditworthiness than the lender is (Michael Spence 2001). Asymmetric information is a problem in the financial market where the borrower has much better information about their financial state than the lender does (Farhan et al 2012;Ahmad 2013;Bhattarai 2017).

2.1.3 Operational risk management maturity model

Operational risk maturity model institutions must develop to a mature level of operational risk management. Realizing growth stages is necessary to reach maturity and efficient operational risk management. The growth stages are :

Initial

This is the starting point where operational risk management practices are informal, unstructured and reactive. Risk identification and assessment are done on an adhoc basis and there is a lack of standardized processes and tools.

Repeatable

At this stage the organization starts to establish operational risk management processes and tools. Risk identification and assessment become more structured and some risk monitoring and reporting mechanisms are put in place.

Defined

The organization develops a comprehensive operational risk management framework with defined policies, processes and roles. Risk assessment and monitoring are integrated into business operations and risk data is collected and analyzed systematically. Training and awareness programs to build a risk awareness programs are implemented to build a risk aware culture.

Managed

Operational risk management processes are well established consistently applied and continuously improved. Risk data is aggregated and analyzed at an entreprise level enabling effective risk reporting and decision making. Quantitative risk measurement techniques are employed and risk appetite and tolerance levels are defined.

Optimized

At this stage operational risk management is fully embedded into the organization strategic planning and decision making processes. Risk management practices are continuously optimized based on data driven insights and industry best practices. Advanced risk modeling and scenario analysis techniques are used to proactively identify and mitigate emerging risks.

2.2 EMPIRICAL LITERATURE

Studies highlight operational risk as a major obstacle for microfinance institutions. In Ghana, research by Gadzo et al. (2019) explored the impact of operational risk on bank performance. Their analysis, using a PLS-SEM method, examined 24 universal banks. The results aligned with concerns, demonstrating a negative influence of operational risk on financial performance (as referenced in Allen Emmanuel Mrindoko, 2020). This underlines the critical need for robust operational risk management practices within the microfinance sector.

Several studies have investigated the relationship between operational risk and financial performance in banks. Imamora and Oswari (2019) examined how credit, operational, and liquidity risks affected banks listed on the Indonesian Stock Exchange. Their analysis, using operational expense divided by operating revenue as a measure of operational risk, revealed a negative impact on financial performance.

Olalere et al. (2018) focused on operational risks and their influence on the performance of 16 commercial banks in Nigeria.Kerongo and Rose (2016) explored the impact of operational risk management practices on the financial performance of Tanzanian commercial banks. These studies highlight the importance of managing operational risk for banks to achieve strong financial performance.

Wood & McConney (2018) investigated the impact of various risks on Barbadian commercial banks. Their analysis, using quarterly data, revealed that operational risk significantly impacted financial performance. Additionally, credit risk and cost-to-income ratio (a measure of operational efficiency) also influenced performance during this period.

Sangmi & Nazir (2010) emphasized the role of management skills as a key internal factor for bank success. Effective management acts as a safeguard, ensuring smooth operations and profitability. They define "excellence management" as controlling costs while boosting productivity, ultimately leading to higher profits. Strong management is crucial for the growth and success of any financial institution. Both operational and credit risks significantly affect bank performance. Efficient cost management is vital for profitability. Effective management skills are a critical internal factor for bank success.

Several studies highlight the significant influence of management decisions on a bank's financial health. Man (1996) specifically found that loan portfolio concentration, a key management choice, has a major impact on performance. Researchers often associate strong bank performance with effective management (Jeong and Phillips, 2001). Management quality is typically assessed by evaluating senior leadership's knowledge and oversight of bank policies and operations.

Beyond these direct actions, Sangmi and Nazir (2010) propose that management quality encompasses a broader range of a bank's qualitative characteristics. This includes the caliber of employees, the established organizational culture, adherence to internal and external regulations, and the bank's overall risk tolerance. In essence, effective management practices permeate all aspects of a bank's operations, influencing its financial success.

A study by Mary (2015) investigated the link between operational risk management practices and the financial performance of Tanzanian commercial banks. The research employed regression analysis to assess the impact of operational risk management on bank returns. The findings revealed a positive correlation, suggesting that effective operational risk management practices contributed to improved financial performance for Tanzanian commercial banks during this period.

The study examined the effectiveness of operational risk management practices in Tanzanian financial institutions. Researchers focused on a sample of five banks in Dar es Salaam. The analysis revealed that most respondents indicated a lack of well-implemented operational risk management practices within these institutions.

The study highlights a challenge faced by Tanzanian bank management: non-performing loans. Existing literature suggests that managing and overseeing these loans often leads to increased resource allocation. This, in turn, can inflate operating costs relative to income

growth, resulting in a higher cost-to-income ratio, which can negatively impact a bank's operational efficiency.

The backbone of bank performance studies consistently highlight the critical role of management in a bank's financial success. Magese (2017) emphasizes management's impact on operational costs and profitability. Effective management oversees bank operations, ensures a sound loan portfolio, and makes wise investment decisions. Hayes (2019) reinforces this notion, stating that strong management remains the cornerstone of a well-functioning bank. Magese (2017) further defines management quality. This encompasses the ability of leadership to identify, quantify, and manage risks while ensuring the bank operates safely, soundly, and compliantly.

Harelimana's 2017 study on Unguka Bank Ltd. provides additional evidence. Their research underlines the strong correlation between risk management practices and financial performance. Notably, the study also suggests that firm size may not be as significant a factor in microfinance performance compared to operational risk management. In essence, effective management practices are the bedrock of a bank's financial health. From controlling costs and making sound investments to mitigating risks, strong leadership plays a crucial role in a bank's success.

2.3 CONCEPTUAL LITERATURE

A bank's risk exposure is mostly made up of operational risk (Koekemoer, 2019). A significant amount of a bank's risk exposure is operational risk, which is something that banks are exposed to on a regular basis (De Jonghe 2010). Operational risk is categorised as a pure risk since it can result in financial loss for a bank, in contrast to other financial risks Rajendran 2012).Several banks and other financial institutions have failed due to ineffectively mitigating and managing operational risk during previous operational risk occurrences (Ferreira, 2015).Operational risk has an impact on the entire bank since it might raise additional, severe firm-wide hazards (Sweeting, 2011).Because of numerous irrational stakeholder behaviours, operational risk events like internal and external fraud can make other banking risks like credit risk, liquidity risk, and market risk extremely high (Sturm 2013).

Operational risk has been shown to significantly affect microfinance institutions' financial performance. According to research by Ivanova and Andrianova (2015), operational risk

affects a microfinance institution's profitability, with a rise in operational risk translating into a fall in profitability. According to Armendariz and Morduch (2014), operational risk can affect a microfinance institution's financial performance directly or indirectly, driving up expenses and decreasing productivity.

Effective risk management is essential to the long-term viability of microfinance institutions, according to research. According to a World Bank study, risk management can help microfinance institutions perform better financially and operationally, become more resilient to shocks, and have a greater social impact.

2.4 RESEARCH GAPS

Researchers studying the impact of operational risk on microfinance institution should consider the contextual factors that influence their performance .The many institutional and socioeconomic contexts in which microfinance operates can have a big impact on how operational risk and performance are related. Taking into consideration contextual elements including market conditions, regulatory frameworks, and client characteristics might improve our comprehension of the precise mechanisms by which operational risk impacts microfinance success.

Operational risk quantification: The development of suitable approaches to assess operational risk in the microfinance environment is the research gap. Operational risk includes a range of internal concerns, including fraud, human resources, technology malfunctions, and quality of management. Establishing reliable frameworks and metrics to precisely assess operational risk in the microfinance industry will require more study.

Studies that follow a longitudinal approach; many of the current research on the effect of operational risk on microfinance performance is cross-sectional in nature, concentrating on a particular period of time. Longitudinal studies that monitor microfinance over a lengthy time frame would shed light on how operational risk is dynamic and how it affects performance over the long run. These kinds of investigations might be useful in determining the delayed impacts of operational risk and detecting possible feedback loops between performance outcomes and risk management practices.

Performance measures: the determination of suitable performance metrics that account for the influence of operational risk on microfinance organisations represents another research need. Even though return on equity and return on assets are popular financial measures, they could

not adequately reflect the unique risks and difficulties that microfinance faces. A more complex understanding of the relationship between operational risk and microfinance performance may be possible through the development of comprehensive performance indicators that take both non-financial and financial factors into account.

Comparative analysis: While some studies have looked at how operational risk affects the success of individual microfinance firms, there aren't many that compare different microfinance sectors in different nations. The differences in operational risk management practices, the efficacy of risk reduction techniques, and the performance results that follow could all be clarified by comparative analysis. Additionally, it might aid in identifying best practices and lessons discovered that the microfinance sector might benefit from.

Strategies for mitigating risk: further research is necessary on effective risk mitigation techniques, even if some studies have examined the effect of operational risk on performance. Microfinance can reduce the detrimental effects of operational risk on their performance by identifying and assessing the efficacy of various risk management practices, such as internal controls, fraud prevention strategies, and technology adoption.

Client perspectives: The majority of research that has already been done focuses mostly on the financial performance of microfinance, sometimes ignoring the viewpoints and experiences of the people they assist. There is a significant knowledge gap about how operational risk impacts the customer experience, including their ability to receive financial services, their repayment habits, and their level of happiness overall. Examining the effects of operational risk at the client level may help create client-centric risk management strategies and raise the general efficacy of microfinance.

CONCLUSION

Although there is a wealth of information regarding how operational risk affects microfinance performance, it is evident that operational risk can significantly affect an institution's capacity to offer financial services to its clientele. It is commonly acknowledged that operational risk is one kind of risk that can cause major losses in any financial firm..

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This chapter provides an explanation of the research methodology. The research methodology specifies the procedures that will be followed to conduct the investigation. Cresswell and Plano Crack (2013) define research methodology as the set of principles and methods that influence the design and implementation of research investigations, such as data collection, analysis, interpretation, and communication. The methodology section includes a description of the research design, demographic, sample, data collection method, variable measurement, and data analysis methodologies.

3.1 Research Design

According to Bryman (2014), research design pertains to the comprehensive blueprint or framework of a research endeavor, encompassing the methodology, approach, and procedures employed to tackle the study challenge. In this study, a descriptive research design was adopted. The effect of operational risk on microfinance performance was observed and described using a descriptive design. Regression analysis is a quantitative study design used to investigate how operational risk affects microfinance institution performance. It has been acknowledged that the descriptive design technique enables the investigation of variable relations.

3.2 Data Sources

3.2.1 Secondary Data

The term "secondary data" refers to information that has been gathered; examples include reports, articles, statistical data sets, and archival materials (Louis Cohen and Lawrence Manion 2016). Financial statements from KCI Microfinance were the source of secondary data. For the last eight years, from 2016 to 2023, the study gathered secondary data regarding the effect of operational risk on microfinance performance.

3.3 Target Population and Sampling Procedures

3.3.1 Population

A target audience is a demographic that the study aims to reach (Saunders, lews, and thornhill 2012). The current study's target area consists of KCI microfinance in Zimbabwe. One

reputable and well-known microfinance company is KCI Microfinance. It offers a wide variety of financial solutions, such as company, farmer, and salaried loan options. Considering these factors, selecting KCI as the focal point of this research will provide a focused and in depth analysis of the impact of operational risk on microfinance performance, contributing to the existing body of knowledge and providing valuable insights for practitioners and policymakers in the microfinance sector.

3.3.2 Sample Size

According to Louis Cohen, Lee A. Cooper, and Lawrence Manion (2020), the sample size is the total number of units (persons, things, and events) drawn from a broader population for a research study. Since it is challenging to examine operational risk's effects on each and e very microfinance institution in Zimbabwe , the researcher had to choose a sample that accurately reflected the target audience. The three branches of KCI microfinance were the only subject of the current study.

3.4 Methods for Data Collection

In order to acquire data, publicly accessible financial statements from a sample of three KCI microfinance institution branches between 2000 and 2023 were gathered. Operational risk indicators were established using proxies such as cost-to-income, operating expense ratio, and operational efficiency ratio. Additionally, proxies were used to create performance measures, such as return on asset.

3.5 Description of Variables and Expected Relationships

Dependent Variables

A financial ratio called return on asset (ROA) is used to assess how earnings and total assets are related to one another. According to Kennon (2011), the return on assets measures how efficiently assets are used. The ability of microfinance management to make money off of its assets is reflected in return on assets. It is the ratio of net income to total assets in the microfinance industry and is thought to be the most reliable and popular measure of company profitability and earnings.

Independent Variable

The cost-to-income ratio (CIR) is a key metric used to assess the operational efficiency of microfinance institutions (MFIs) (Chalise, 2019). It reflects the percentage of operating

expenses that an MFI incurs relative to its operating income. Calculated by dividing operational income by non-interest operating expenses, a lower CIR generally indicates a more efficient MFI. Conversely, a higher CIR suggests less efficiency, meaning the MFI spends a larger portion of its income on operating costs.

This study defines the CIR specifically as the ratio of operating costs (excluding bad and doubtful debts) to net interest income (which includes non-interest income earned by the MFI). This provides a focused view of how efficiently core MFI operations are generating income compared to their operating expenses.

Operational Efficiency Ratio. This ratio indicates how well an MFI leverages its resources to serve clients. It's calculated by dividing operational costs by total assets. A higher ratio signifies greater efficiency, while a lower ratio suggests less efficient resource allocation.

Operating Expense Ratio (OER). Considered a measure of effective management, a lower OER is preferable for MFIs. It's calculated by dividing operating expenses by operating income. A smaller OER indicates the MFI's management can effectively control operational costs, which is crucial for sustainable growth and success.

Control Variables

The performance of microfinance institutions can be significantly impacted by a nation's currency exchange rate. Microfinance institutions may incur increased costs as a result of having to convert USD into local currency when the exchange rate declines. Exchange rate fluctuations can also cause unpredictability and volatility, which makes it challenging for microfinance institutions to efficiently plan and carry out their business. Examining the variations in important performance metrics like loan payback rates, profitability, and customer satisfaction before and after a sizable shift in the exchange rate is one technique to gauge how the exchange rate affects microfinance performance.

Interest rates: While high interest rates can boost earnings, they can also deter potential customers from taking out loans, which could be detrimental to the institution's overall success. Loan pricing: Interest is frequently added to the loans that microfinance institutions give their customers. High interest rates may cause their expenses to rise and their earnings to fall.

The profitability of microfinance institutions may be negatively impacted by increasing inflation, which can raise the cost of goods and services. Customers may be deterred from taking out loans by high inflation rates if they are concerned about how inflation will affect their ability to repay the loan.

3.8 Data Analysis Procedures

This study employed a descriptive and multiple regression model.

Analytical Model

This study employed multiple regression model to investigate the link between the dependent variables of return on asset and the independent variables of cost to income ratio, operational efficiency ratio, operational expense ratio, and control factors. Multiple regression model enables you to quantify and evaluate the degree, direction, and statistical significance of the correlations between the dependent variable and several independent variables. It offers a systematic approach to determining the extent to which changes in the independent variables are connected with changes in the dependent variable. It lets you to determine which independent factors have the most impact on the dependent variable.

By analysing the regression coefficients and their statistical significance, the researcher may identify which independent variables are most important in explaining the variation in the dependent variable. It gives statistical measurements to analyse the regression model's goodness of fit and overall performance. Multiple regression model can be used to predict and forecast outcomes. Once the regression model has been estimated and validated, it can be used to predict the value of the dependent variable using known values for the independent variables. This can be useful for making educated judgments and developing strategies in a variety of disciplines, including microfinance.

$$ROA_{it} = \alpha + \beta_1 CTIR + \beta_2 OPER + \beta_3 OER + \beta_4 IFLR + \beta_5 INTR + \beta_6 EXCHR + \varepsilon_{it}$$

Where;

t represents the time in years

A is a constant term

ε_{it} is an error term or unexplained residual

B_1, β_2, β_3, β_4, β_5, β_6 are coefficients of independent variables

ROA=Annual net income divided by total assets

ROE=Annual net income divided by common stockholders equity

CTIR=Operating expenses divide by operating income

OPER= Operational costs divide by total assets

OER=operating expense divide by total assets

IFLR=annual inflation rate in percentage

INTR=annual interest rate in percentage

EXCHR= annual exchange rate in percentage

CONCLUSION

This study employed a quantitative approach to examine the impact of operational risk on the performance of microfinance institutions. Regression analysis was used to determine the link between operational risk and performance measures. The research approach used was deemed to be appropriate for the study issue since it allowed for robust analysis and the identification of significant correlations between variable.

CHAPTER 4

DATA ANALYSIS, RESULTS AND INTERPRETATION

4.0 INTRODUCTION

In this chapter, the research findings regarding the impact of operational risk on the performance of microfinance institutions in Zimbabwe are presented. The study examined a period of eight years, specifically focusing on secondary data from 2016 to 2023 for the analysis. The data was analyzed using regression analysis techniques.

4.1 DESCRIPTIVE STATISTICS

	MIN	MAX	MEAN	MEDIAN
RETURN ON ASSET RATIO	0.12	0.37	0.2562	0.25
COST TO INCOME RATIO	0.41	0.70	0.5454	0.5450
OPERATING EXPENSE RATIO	0.25	0.55	0.3783	0.355
OPERATING EFFICIENCY RATIO	0.39	0.65	0.5008	0.50
EXCHANGE RATE	0.015	0.027	0.0211	0.021
INTEREST RATE	0.010	0.050	0.02523	0.0245
INFLATION RATE	0.015	0.039	0.02504	0.0235

Figure 1.1descriptive statistics

The minimum return on assets (ROA) of 0.12 represents the lowest level of profitability observed within the microfinance portfolio. It indicates the performance of the least profitable or efficient asset in the portfolio. On the other hand, the maximum ROA of 0.37

signifies the highest level of profitability achieved within the microfinance. This suggests the presence of highly profitable and efficient assets. The mean ROA of 0.2562 represents the average return on assets across the portfolio, while the median ROA of 0.25 represents the middle value of the ROA.

In terms of the cost to income ratio (CIR), the minimum ratio of 0.41 indicates the lowest level of costs relative to income observed within the institution. A lower CIR generally indicates better financial health and efficiency, as it implies that a smaller portion of income is being used to cover operating costs. On the other hand, the maximum CIR of 0.70 signifies the highest level of costs relative to income, suggesting a higher proportion of income being consumed by operating expenses, potentially impacting overall profitability. The mean CIR of 0.5454 and median CIR of 0.545 provide measures of the average and middle levels of costs relative to income, respectively.

Regarding the operational efficiency ratio (OER), the minimum OER of 0.25 indicates efficient management of operating expenses compared to total assets. Conversely, the maximum OER of 0.55 suggests less efficient management of operating costs. The mean OER of 0.3783 indicates that, on average, the microfinance branches in the dataset allocate 37.83% of their total assets to cover operating expenses. The median OER suggests that some microfinance branches have an OER lower than 0.355, while others have an OER higher than 0.355.

The range of exchange rates, from a minimum of 0.015 to a maximum of 0.027, indicates potential foreign exchange risk for microfinance branches. Managing this risk is crucial to ensure financial stability and competitiveness within the market. The mean exchange rate of 0.0211 and median exchange rate of 0.021 may prompt microfinance institutions to consider adjustments in interest rates for microcredit, impacting the cost of borrowing for clients and the financial performance of the institution. For example, the Checheche branch may face challenges when converting Rands into USD$.

4.2.0 DIAGONISTIC TEST

4.2.1 DURBIN-WATSON TEST

DW 1.4528	P-VALUE 0.0328

Figure 1.2 Durbin Watson Test

H_0: There is no autocorrelation

H_1: There is autocorrelation

AUTOCORRELATION ASSESSMENT

The Durbin Watson (DW) statistic of 1.45, which is below the critical value of 2, indicates the potential presence of positive autocorrelation in the residuals.

In terms of statistical significance, the p-value of the Durbin Watson test is 0.03, which is lower than the significance level of 0.05. Therefore, we reject the null hypothesis, indicating the presence of autocorrelation.

4.2.2 BOXPLOT

BOXPLOT FOR EXCHANGE RATE

BOXPLOT FOR OPERATING EFFICIENCY RATIO

BOXPLOT FOR INTEREST RATE
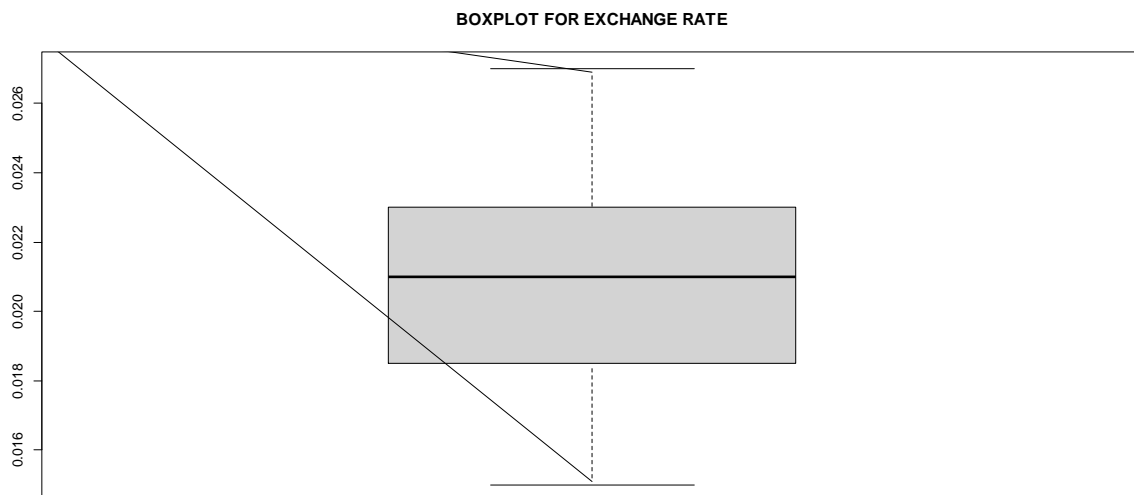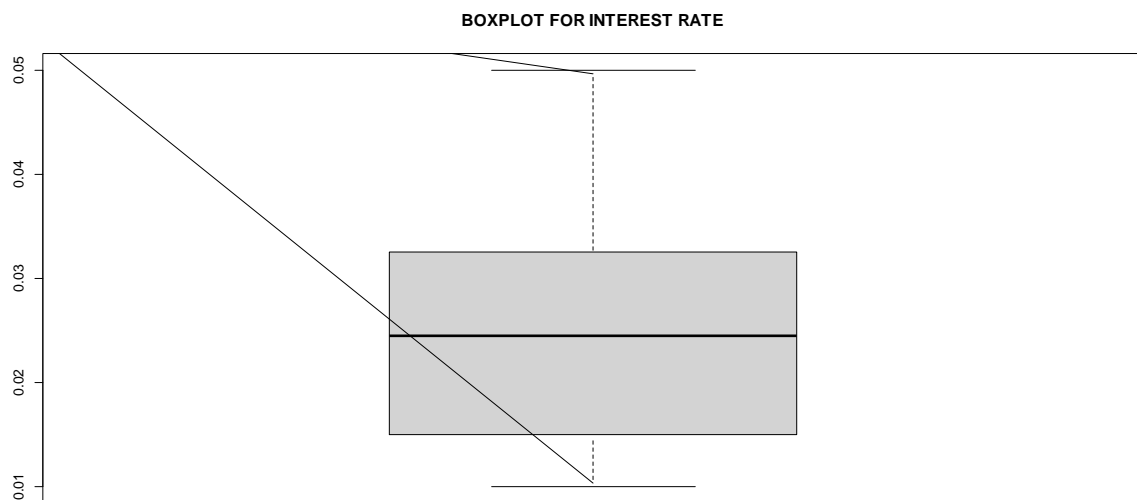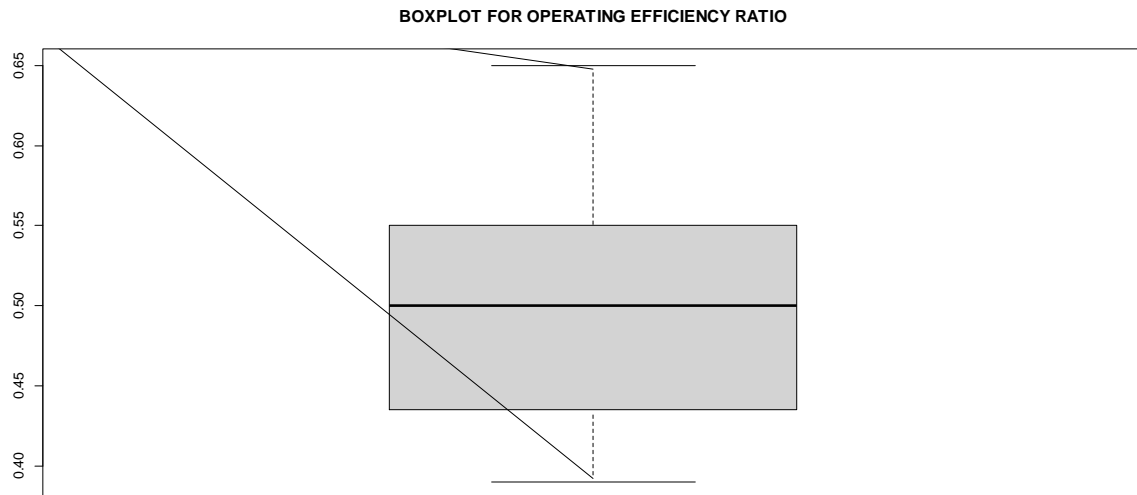
FIGURE 1.3 BOXPLOT

The placement of the median line within the box in a boxplot offers information about the symmetry of the data. In a normal distribution, the median tends to align with the mean, resulting in the median line of the boxplot being positioned at the center of the box. Therefore, when the median line is centered, as shown in the above boxplots, it suggests that the assumption of normality for multiple regression is satisfied.

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4.2.3 STUDENTIZED BREUSCH-PAGAN TEST

BP	DF	P- VALUE
7.771	6	0.0414

FIGURE 1.4 Studentized Breush

H_0: There is no homoscedasticity

H_1: There is homoscedasticity

Breusch Pagan Test Statistic

The test statistic is used to assess the overall significance of the regression model in explaining the variability of the dependent variable. In this instance, the computed BP value is 7.771. When the Breusch Pagan test is 7.771 it means that test has produced a specific value that is used to assess the presence of heteroscedasticity. A higher BP value indicates a more robust relationship between the independent variables and the variance of the residuals.

Degree of Freedom

The concept of degrees of freedom refers to the number of independent data points or pieces of information that are available to estimate a statistical parameter. In the current test, there are 6 degrees of freedom.

P-Value

The p-value associated with the test statistic indicates the level of significance and provides an indication of the strength of the evidence against the null hypothesis. In this case, the p-value is 0.0414, which suggests evidence against the null hypothesis. This implies that, based on the test results, the assumption of homoscedasticity is not violated.

4.2.4 VIF Model

Cost to income rujatio	1.979024
Operating expense ratio	1.327075
Operational efficiency ratio	1.729462
Interest ratio	1.84107
Exchange rate	1.261756
Inflation rate	1.270214

Figure 1.5 VIF Model

The variables, including the cost to income ratio, operating expense ratio, operational efficiency ratio, interest rate, exchange rate, and inflation ratio, have VIF (Variance Inflation Factor) values of 1.979024, 1.327075, 1.729462, 1.846107, 1.261756, and 1.270214, respectively. These values suggest relatively low levels of multi-collinearity, which is beneficial for the regression analysis.

4.3 Model Output

	COEFFIENTS	EST.STD ERROR	t VALUE	Pr(>|t|)
Intercept	0.57737	0.15250	3.786	0.00147**
Cost to income ratio	-0.04202	0.20085	-0.209	0.83687
Operating expenses ratio	-0.44552	0.13460	-3.310	0.00414**
Operational efficiency ratio	0.01211	0.16966	0.071	0.94393
Interest rate	-4.14521	1.20712	-3.434	0.00317**
Exchange rate	-1.05548	3.24686	-0.325	0.74909
Inflation rate	-0.35282	1.62177	-0.218	0.83037

Figure 1.6 Model Output

The coefficients obtained from the table above indicate that the operating expense ratio (OER) and interest rate have a significant impact on the return on assets (ROA) of microfinance institutions in Zimbabwe. The coefficient for OER is β = -0.44552 with a t-value of -3.310, and for the interest rate, it is β = -4.14521 with a t-value of -3.434. The negative coefficients suggest a negative relationship between OER, interest rate, and ROA. Specifically, holding other variables constant, a one-unit increase in OER would result in a

decrease of 0.44552 in ROA, and a one-unit increase in the interest rate would lead to a decrease of 4.14521 in ROA. Therefore, microfinance institutions should aim to reduce their operating expenses relative to total assets and lower the interest rate to improve their financial performance.

Regarding the other operational risk proxies, the coefficient for the exchange rate is -1.05548, for the inflation rate it is -0.35282, and for the cost to income ratio (CIR) it is -0.04202. Holding other variables constant, a one-unit increase in exchange rate, inflation rate, and CIR would result in a decrease in financial performance (ROA) by -1.05548, -0.35282, and -0.04202 respectively. The negative coefficients indicate an inverse relationship between these

proxies of operational risk and the financial performance of microfinance institutions. However, the t-values for these coefficients were -0.325, -0.218, and -0.209, respectively, and the p-values were 0.74909, 0.83037, and 0.83687. These results suggest that the coefficients for exchange rate, inflation rate, and CIR are statistically insignificant, meaning their relationship with ROA is not statistically supported.

The coefficient for the operational efficiency ratio (OPER) is 0.01211, with a t-value of 0.071 and a p-value of 0.94393. This positive coefficient indicates that operational efficiency has a positive effect on ROA. Holding other variables constant, a one-unit increase in OPER would lead to a 0.01211 increase in ROA. These findings are consistent with King'ori, Kioko, and Shikumo (2017), who observed a positive and significant influence of operational efficiency on ROA in microfinance institutions.

Residual standard error	0.04722
Multiple R-squared	0.6797
Adjusted R-squared	0.5667
F-statistic	6.013
P-value	0.001594

Figure 1.7 Results

The correlation and coefficient of determination were used to measure and test the relationship between the dependent variable (financial performance of microfinance in Zimbabwe) and the independent variables (cost to income ratio, operating expenses ratio, exchange rate, interest rate, inflation rate, and operational efficiency) combined. The findings showed that 67.97% of the returns of the KCI microfinance institution could be attributed to the independent variables examined in this study.

The residual standard error quantifies the average deviation of the response variable from the true regression line. A lower residual standard error of 0.04722 indicates a closer fit of the model to the data. The multiple R-squared value indicates the proportion of the variance in the dependent variable (financial performance) that can be predicted by the independent

variables in the regression model. A higher R-squared value of 0.6797 suggests that the independent variables are more effective in explaining the variation in the dependent variable.

The adjusted R-squared penalizes the R-squared value for including irrelevant predictors. A higher adjusted R-squared value of 0.5667 indicates a better fit of the model, accounting for the inclusion of relevant predictors. The F-statistic compares the model with no predictors to the full model, and the associated p-value of 0.001594 represents the probability of observing the F-statistic.

4.4 CONCLUSION

The analysis of operational risk in microfinance institutions uncovered several important relationships. Variables such as operating expenses ratio (OER), operational efficiency ratio (OPER), interest rate, exchange rate, and cost to income ratio and inflation were found to have a negative impact on return on assets (ROA), while OPER was found to have a positive influence on ROA, leading to improved financial performance of microfinance institutions. The study confirmed the existence of a relationship between operational risk and financial performance.

The regression results indicated that operational risk has a statistically significant and inverse relationship with the financial performance of microfinance institutions, as measured by return on assets. This suggests that reducing operational costs can contribute to enhanced financial performance for microfinance banks. The study recommends that microfinance institutions manage their operational risk by implementing effective and efficient information technology communication systems that can reduce operational costs and wages. Additionally, investing in fintech and digital credit systems can help reduce staff costs associated with outreach efforts in microfinance institutions.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter provides a summary of the study's findings, conclusions, and recommendations. It is structured into several sections: Section 5.1 presents a summary of the findings, Section 5.2 presents the conclusions drawn from the study, Section 5.3 provides recommendations based on the findings, Section 5.4 identifies areas for further research, and Section 5.5 offers a summary of the entire chapter.

5.1 SUMMARY OF FINDINGS

The study examined the relationship between dependent variables (return on asset) and independent variables (cost to income ratio, operating expense ratio, operational efficiency) along with control variables (inflation, interest rate, exchange rate). The findings revealed that the operating expense ratio and cost-to-income ratio had a significant negative relationship with return on asset (ROA). This suggests that as the operating expense ratio and cost-to-income ratio increase, the ROA decreases. Specifically, a $1 increase in the cost-to-income ratio leads to a $0.04202 decrease in ROA, while an increase in the operating expense ratio causes a reduction of 0.44552 in ROA. On the other hand, the operational efficiency ratio (OPER) had an insignificant impact on ROA, but it showed a positive relationship, whereas the cost-to-income ratio had a negative relationship with ROA.

Cost-to-Income Ratio, a key efficiency metric in microfinance. The cost-to-income ratio (CIR) is a widely used indicator in microfinance to assess an institution's operational efficiency. It's calculated as non-interest expenses divided by gross income.

A lower CIR indicates better management efficiency in handling assets. This means the microfinance institution keeps its operating expenses in check relative to the income it generates. Conversely, higher CIR values suggest potential weaknesses in management. The microfinance institution might be spending a larger portion of its income on operational costs, impacting profitability. The CIR is a crucial financial measure not just for microfinance institutions, but also for banks in general. Lower CIR values are generally preferred as they signal cost-effectiveness and improved profitability for financial institutions.

This research explores the theoretical relationship between a microfinance institution's (MFI's) operating expenses and its profitability. It was hypothesized that a negative correlation would exist between the operating expense ratio (OER) and profitability. The study acknowledges that management quality significantly influences operating expenses. Effective management practices can help control costs, ultimately impacting profitability. The research confirms the theorized negative association. The analysis revealed a negative correlation between the OER and return on assets (ROA), a common profitability measure. This suggests that when operating expenses rise relative to income, MFI profitability declines.

This research investigates the relationship between a microfinance institution's (MFI's) operating expenses and its profitability. The study confirms the expected negative correlation between the operating expense ratio (OER) and return on assets (ROA), a key profitability metric. This implies that higher operating expenses relative to income lead to lower profitability for MFIs. These findings align with previous research that has established a negative association between OER and ROA.

However, some studies on Kenyan commercial banks report a positive link between OER and ROA. These discrepancies are likely due to variations in factors like, the specific MFIs or banks studied can influence the results. Different economic conditions across time periods can impact the relationship between operating expenses and profitability. Regulatory environments and financial systems can differ across countries, potentially leading to contrasting results. This research, along with existing literature, highlights the importance of considering data source variations, including MFI selection, timeframes, and geographical location, when interpreting research findings on MFI performance. This comprehensive analysis supports the idea that such variations can contribute to differences observed in research results (Sporta et al., 2017).

5.2 CONCLUSION

The study findings emphasized the concentration of the operating expense ratio (OER) and cost-to-income ratio (CIR) in the microfinance industry of Zimbabwe. Through inferential statistics, the results demonstrated a significant and negative impact of OER and CIR on

return on assets (ROA). These findings suggest that the cost management practices in microfinance banks were not optimal, highlighting the need for stricter risk management measures.

Furthermore, the study revealed a negative and statistically significant relationship between inflation rate, exchange rate, interest rate, and microfinance's ROA. Specifically, when interest rates increase, microfinance profitability suffers negative impacts. This implies that even if interest rates, exchange rates, and inflation rates were to rise, microfinance institutions in Zimbabwe would not be able to generate profits.

5.3 RECOMMENDATIONS

This study confirmed that the cost-to-income ratio, operating expense ratio, operational efficiency ratio, inflation, exchange rate, and return on assets (ROA) significantly impact the financial performance of microfinance institutions in Zimbabwe. Therefore, it is crucial for microfinance institutions to effectively manage their operations, considering the influence of factors such as operational efficiency and cost-to-income ratio on profitability and overall financial performance. By addressing these risks, microfinance institutions can achieve stability and provide credit to businesses, contributing to economic development.

Additionally, the study revealed a negative correlation between operational risks and the financial performance of microfinance institutions in Zimbabwe, while the operational efficiency ratio had a positive influence on financial performance. Consequently, the study recommends that microfinance institutions in Zimbabwe should carefully balance their borrowing and deposit rates, as they face various risk factors that can impact their operations and financial stability.

5.4 AREAS FOR FURTHER RESEARCH

This paper focuses on investigating the impact of operational risk on the performance of microfinance institutions in Zimbabwe. Due to limitations in data availability, other independent variables could not be included in the study. Therefore, further research is recommended to explore the influence of operational risk, along with additional variables such as capital adequacy, on the financial performance of microfinance institutions in Zimbabwe.

The study findings indicated that the operating expenses ratio, operational efficiency ratio, portfolio concentration ratio, and operations efficiency ratio have an impact on the financial

performance of microfinance institutions in Zimbabwe. However, it is important to note that the analytical model used in this study may be incomplete. This is because the findings contradict some previous research that established a significant positive association between inflation, exchange rate, interest rate, cost-to-income ratio, operating expenses ratio, operational risk, and financial performance. Additionally, previous studies have suggested that microfinance institutions with higher levels of capital intensity tend to have lower financial performance. Therefore, further investigation is needed to understand the reasons behind these discrepancies in findings.

5.5 CHAPTER SUMMARY

To conclude, the analysis of operational risk in microfinance institutions has yielded important insights into the factors that influence performance. Drawing from these findings, there are several recommendations that can be proposed to enhance the management of operational risk in microfinance institutions.

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APENDIX: KCI MICROFINANCE AND ITS THREE BRANCHES

Year	return on asset	cost to income ratio	operating expense ratio	operating efficiency ratio	exchange rate	interest rate	inflation rate
2000	0,12	0,65	0,45	0,45	0,021	0,05	0,025
2001	0,2	0,63	0,43	0,5	0,023	0,035	0,028
2002	0,27	0,54	0,36	0,4	0,031	0,03	0,039
2003	0,23	0,58	0,25	0,55	0,029	0,042	0,02
2004	0,19	0,5	0,3	0,6	0,025	0,04	0,035
2005	0,18	0,41	0,49	0,55	0,016	0,015	0,025
2006	0,22	0,38	0,55	0,59	0,023	0,01	0,02
2007	0,19	0,37	0,5	0,65	0,028	0,02	0,03
2008	0,3	0,35	0,45	0,51	0,021	0,025	0,035
2009	0,23	0,49	0,52	0,63	0,018	0,03	0,015
2010	0,32	0,57	0,29	0,39	0,026	0,016	0,015
2011	0,17	0,65	0,39	0,45	0,047	0,0316	0,03
2012	0,15	0,7	0,43	0,49	0,049	0,035	0,035
2013	0,26	0,62	0,35	0,4	0,0213	0,022	0,021
2014	0,24	0,58	0,37	0,42	0,028	0,024	0,023
2015	0,3	0,55	0,33	0,41	0,0163	0,023	0,032
2016	0,28	0,56	0,32	0,43	0,023	0,03	0,028
2017	0,22	0,45	0,3	0,49	0,024	0,032	0,011
2018	0,33	0,56	0,31	0,59	0,027	0,033	0,023
2019	0,34	0,5	0,32	0,55	0,018	0,012	0,019
2020	0,36	0,49	0,29	0,5	0,019	0,011	0,012
2021	0,35	0,51	0,34	0,44	0,015	0,014	0,016
2022	0,33	0,55	0,3	0,51	0,016	0,015	0,017
2023	0,37	0,5	0,44	0,2	0,021	0,01	0,011