

MIDLANDS STATE UNIVERSITY



FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

An Investigation of the Relationship Between Branchless Banking Activities and Profitability of Commercial Banks in Zimbabwe: Panel Data Analysis (2011 – 2017)

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A dissertation submitted to the Midlands State University in partial fulfilment of the requirements for the Bachelor of Commerce Economics Honours Degree

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SUPERVISOR’S APPROVAL FORM

The undersigned certify that they have supervised the student, **Ernest Nyimai (R152852F)** dissertation entitled: “**An Investigation of the Relationship Between the Branchless Banking Activities and Profitability of Commercial Banks in Zimbabwe: Panel Data Analysis (2011 – 2017)**”, submitted in partial fulfilment of the requirements of Bachelor of Commerce Economics Honours Degree at the Midlands State University.

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CHAPTER 1

CHAPTER 2

CHAPTER 3

CHAPTER 4

CHAPTER 5

DATE/...../.....

APPROVAL FORM

The undersigned certify that they supervised, read and recommend to the Midlands State University for acceptance of a research project entitled: **“An Investigation of the Relationship Between the Branchless Banking Activities and Profitability of Commercial Banks in Zimbabwe: Panel Data Analysis (2011 – 2017)”** submitted by **Ernest Nyimai (R152852F)** in partial fulfilment of the requirements for the Bachelor of Commerce Economics Honours Degree.

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DECLARATION

I, **Ernest Nyimai**, do hereby declare that this is a true and unpublished research, which presents my own work, and has never previously submitted for a degree at Midlands State University or any other university, college or any institution.

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DATE

DEDICATION

I would like to dedicate this research project to my family for their support.

ACKNOWLEDGEMENTS

Firstly, I would like to acknowledge the Almighty God for the guidance and protection during the period of writing this research project. This research project makes me indebted to several people. Without their support, it could have never been a success but a fruitless endeavour.

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ABSTRACT

The motive behind carrying out of this study was the ever changing and unstable profitability levels experienced in the Zimbabwe banking sector particularly after the adoption of various branchless banking activities by various commercial banks. The purpose of this study was to investigate the relationship between the branchless banking activities and profitability of banks using a case study of commercial banks in Zimbabwe. Various theories and empirics were reviewed and have revealed that some branchless banking activities has positive relationship with profitability of commercial banks whilst others are inversely related to profits. The findings on the literature reviewed have somehow differed in the forms of branchless banking activities that were found significant in explaining bank profits. The research used micro panel annual data for 12 commercial banks for a period of 7 years (2011-2017). Diagnostic tests were performed on the data prior to estimations of the Pooled OLS regression. Return on Assets was used as a measure of bank profits. The study found that mobile banking, debit cards, RTGS and POS were statistically significant in determining bank profits. However, POS was found to be inversely related to bank profits. The researcher then concluded that mobile banking, debit cards, RTGS and POS are the major forms of branchless banking adopted by banks in Zimbabwe. Recommendations were that among others, banks must shift from traditional to branchless banking activities, increase awareness on the activities and increasing investment in branchless banking activities. Use of different methodology and case studies for further research study on the similar topic was recommended.

TABLE OF CONTENTS

SUPERVISOR’S APPROVAL FORM	i
APPROVAL FORM	ii
DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
TABLE OF CONTENTS	vii
LIST OF FIGURES	xi
LIST OF TABLES	xii
LIST OF APPENDICES	xiii
LIST OF ACRONYMS	xiv
CHAPTER ONE	1
INTRODUCTION	1
1.0 Introduction	1
1.1 Background of the Study.....	1
1.2 Problem Statement	6
1.3 Objectives of the Study	6
1.4 Research Hypothesis	6
1.5 Justification of the Study.....	7
1.6 Delimitations of the Study.....	7
1.7 Study Limitations	8
1.8 Organisation of the rest of the Study.....	8
CHAPTER TWO	10
LITERATURE REVIEW	10
2.0 Introduction	10
2.1 Theoretical Review	10

2.1.1 Branchless Banking Defined	10
2.1.2 Bank Led Theory	11
2.1.3 Non-Bank-Led Theory	11
2.1.4 Bank-Focused Theory.....	12
2.1.5 The Technology Acceptance Theory (TAT)	13
2.1.6 Innovation Diffusion Theory (IDT).....	13
2.1.7 The Structure Conduct Performance (SCP) Theory	14
2.2 Empirical Literature Review	15
2.3 Conclusion.....	17
CHAPTER THREE.....	18
RESEARCH METHODOLOGY	18
3.0 Introduction	18
3.1 Model Specification	18
3.2 Justification of Variables.....	18
3.2.1 Debit/Credit Cards (DCs)	18
3.2.2 Mobile Banking (MB)	19
3.2.3 Real Time Gross Settlement (RTGS)	19
3.2.4 Telegraphic Transfers (TTs)	20
3.2.5 Point of Sale (POS).....	20
3.2.6 Internet Banking (IB).....	20
3.2.7 Error Term (<i>μit</i>).....	21
3.3 Study Population and Sample	21
3.4 Data Type and Sources.....	21
3.5 Static Panel Model Diagnostic Tests.....	22
3.5.1 Panel Unit Root Test.....	22
3.5.2 Hausman Specification Test	23
3.5.3 Breusch Pagan Lagrangian Multiplier (BPLM) Test	24

3.5.4 Model Specification Test.....	24
3.5.5 Multicollinearity Analysis	25
3.5.6 Heteroscedasticity Test.....	25
3.6 Conclusion.....	26
CHAPTER FOUR.....	27
RESULTS PRESENTATION AND ANALYSIS	27
4.0 Introduction	27
4.1 Descriptive Statistics Results	27
4.2 Diagnostic Test Results.....	28
4.2.1 Panel Unit Root Test Results.....	28
4.2.2 Hausman Specification Test Results	29
4.2.3 Breush Pagan Lagrangian Multiplier (BPLM) Test Results	29
4.2.4 Model Specification Test Results	30
4.2.5 Multicolleniarity Analysis Results	30
4.2.6 Heteroscedasticity Test Results	31
4.3 Regression Results Presentation and Interpretation	31
4.3.1 Co-efficient of Determination	32
4.3.2 Debit Cards (DCs)	33
4.3.3 Mobile Banking (MB)	33
4.3.4 RTGS	34
4.3.5 Point of Sale (POS).....	35
4.3.6 Telegraphic Transfers (TTs)	35
4.3.7 Internet Banking (IB).....	35
4. 4 Conclusion.....	35
CHAPTER FIVE	36
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	36
5.0 Introduction	36

5.1 Summary of Findings	36
5.2 Conclusions	37
5.3 Recommendations	38
5.4 Recommendation to further research studies on this topic	40
5.5 Conclusion.....	40
REFERENCES.....	42
APPENDICES	49

LIST OF FIGURES

Figure 1.1 : Trend in ROA for Zimbabwe Banking Sector (2011 – 2017).....	5
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LIST OF TABLES

Table 3.1: Studied Banks	22
Table 4.1: Descriptive Statistics Summary Results	27
Table 4.2: Panel Unit Root Test Results	28
Table 4.3: Hausman Specification Test Results	29
Table 4.4: BPLM Test Results	29
Table 4.5: Ramsey RESET Test Results.....	30
Table 4.6: Correlation Matrix	30
Table 4.6: Heteroscedasticity Test Results	31
Table 4.6: Panel Regression Results	31

LIST OF APPENDICES

Appendix 1: Data Set.....	48
Appendix 2: Descriptive Test Results.....	50
Appendix 3: Unit Root Test Results	51
Appendix 4: Hausman Test Results.....	53
Appendix 5: BPLM Test Results	54
Appendix 6: Ramsey RESET Test Results.....	54
Appendix 7: Heteroscedasticity Test Results	54
Appendix 8: Correlation Matrix.....	55
Appendix 9: Panel Regression Results	55

LIST OF ACRONYMS

AML	Anti-Money Laundering
ATM	Automated Teller Machine
BAZ	Bankers Association of Zimbabwe
CGAP	Consultative Group to Assist the Poor
CTF	Counter Terrorism Finance
EWZ	Econet Wireless Zimbabwe
GSM	Global System for Mobile Communication
HSBC	Hong Kong and Shanghai Banking Corporation
ICT	Information and Communication Technology
NIM	Net Interest Margin
PIN	Personal Identification Numbers
POS	Point of Sale
RBZ	Reserve Bank of Zimbabwe
ROA	Return on Assets
ROE	Return on Equity
RTGS	Real Time Gross Settlement
WB	World Bank
ZETSS	Zimbabwe Electronic Transfer and Settlement System
ZIPIT	Zimswitch Instant Payment Interchange Technology
ZSE	Zimbabwe Stock Exchange

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Innovation and creativity builds on a philosophy suggesting that customers are always conscious about the best quality products offered (Berthon *et al.*, 2004). Worldwide, the banking as well as the financial systems are in the throes of a transformation in the way that banking operations are undertaken. Branchless banking activities for instance the use of Automated Teller Machines (ATM(s)), mobile banking and other electronic banking systems are tremendously flooding in many countries. Schumpeter (1939) defines innovation in the context of financial services as synthesis of knowledge of making products better than before. Literature highlighted that innovation is largely attributed to the works of Schumpeter (1939) who put forward the notion of combining resources and ability to tap skills from others who had the expertise (Troilo, 2014). In the vein of this research, branchless banking has seen to be one of the banking and financial transformation that enhances competitiveness of financial institutions. The general intent of this research is to establish the relationship that exist between branchless banking activities and bank profitability in Zimbabwe using a case study of commercial banks in Zimbabwe.

1.1 Background of the Study

Rajesh (2012) cited in Muhammad (2013) defined banking as the business activity of accepting and safeguarding money owned by other individuals and entities, and then lending out this money in order to earn a profit. Since the introduction of the banking system and the banking business, banks used to provide the normal banking products and services to clients through the use of bank branches. This was called the brick and mortar model. However, overtime, different normal aspects of banking have been transformed and banks begun to venture in other products and services in line with the changes in world dynamics. Some of these venture comprises of debit and credit cards, provision of safe custody of valuable items, lockers, ATM services and online transfer of funds across globally through electronic ways (Rajesh, 2012). With the advent of technology in the banking sectors around the world, these products are now offered without relying on bank branches but rather through the use of internet, mobile phones as well as through bank agents. Branchless banking is basically referring to the channel upon which financial products and services are delivered outside

conventional bank branches that is hinged on using ICT to transmit transaction details (Carmel and Scott, 2009).

The idea of branchless banking was first introduced by United Kingdom after the Midland Bank has started this concept in 1989 with more futures (Porteous, 2008). Midland Bank was one of the Big four banking groups in United Kingdom at that time and it is now part of Hong Kong Shanghai Banking Corporation (HSBC). HSBC is a British multinational company that offers banking and financial services and is headquartered in London United Kingdom. It was founded in London in 1991 by the HSBC members to operate as a separate group holding company (Porteous, 2008).

The first ATM cards were offline. Porteous (2008) also argued that funds could not be automatically withdrawn from the ordinary users' bank accounts but only customers with good traceable credit history could use ATMs. In the year 1914, Western Union issued metal cards known as charge cards which allowed deferred payment to preferred customers (Porteous, 2008). By then, these metal cards were generally known as metal money. These were meant to purchase fuel by customers a decade later after their invention. In 1918, the Federal Reserve Bank transferred their currency by way of telegraph. A decade later, in 1939 Luther George Simjian developed a bank mate automatic teller machine and Citicorp tried this product and half a year later, the company showed that the demand for this automatic teller machine was surprisingly very low (Porteous, 2008).

In the 1980s, Zimbabwe's financial sector was under regulation due to its oligopolistic nature, with pioneer banks in the sector, Barclays and Standard Chartered Bank dominating (Mago and Chitokwindo, 2014). The Monetary Policy Statement of September 2017 has indicated that the banking sector is constituted of 14 operating commercial banks, including POSB, 4 deposit taking microfinance, 4 building societies as well as 164 credit only microfinance institutions. The technological advancement that hit the country since last two decades left banks with no reasonable excuse in adapting to these technological changes. The observation was that the brick and mortar bank branches around the world are gradually becoming of less importance as they are now getting replaced by employment of agent banking as well as the extensive use of computer internet and mobile phones. The resultant impact was that there was reasonably no substantial need for the bank account holders to present themselves to the physical bank branch and or to write cheques, withdrawal and deposit slips. Branchless banking activities has made people's lives easier and reduced time

wasting. It offered convenience; provide safety and security to account holders through agent banking and online banking.

In Zimbabwe, the operating environment for the financial sector banking industry has continued to be competitive; with most banks venturing new innovative products, systems, technology and philosophies that are opposed to traditional once leading to greater efficiency and product differentiation as indicated in the Monetary Policy Statement of February 2018. In as far as technology is concerned, banks are challenged to diversify and offer a wide range of services, investment and credit lines through strategic and distinct channels of distribution which include improved branchless banking activities such as ATMs, internet banking, mobile banking and electronic fund transfers. The relationship between the illuminated investments in technologically advanced bank innovations and outturns in Zimbabwe needs to be investigated. There is need to ascertain whether innovations have potentially contributed significantly to the financial performance of commercial banks.

Branchless banking found its way through the use of electronic payment systems that started in the form of the Zimbabwe Electronic Transfer and Settlement System (ZETSS) which was spearheaded by Reserve Bank of Zimbabwe and ZimSwitch. Bank customers both individuals or corporate could instruct their respective banks to make payments (debiting their accounts, crediting those of their intended counterparties) on their behalf using RTGS. This basically allowed interbank settlement of ATM as well as Point of Sale (POS) transactions. ZimSwitch enabled banks' account holders to withdraw funds from their accounts using their bank cards from respective banks and to make POS purchases in supermarkets such as TM on condition that they have credit balances in their accounts. This ZimSwitch payment system was further improved to ZimSwitch Instant Payment Interchange Technology (ZIPIT) which provided remote conduction of financial services over GSM network using any basic GSM phone. This service allowed customers to instantly send money to any other ZIPIT ready bank in real time (www.rbz.co.zw).

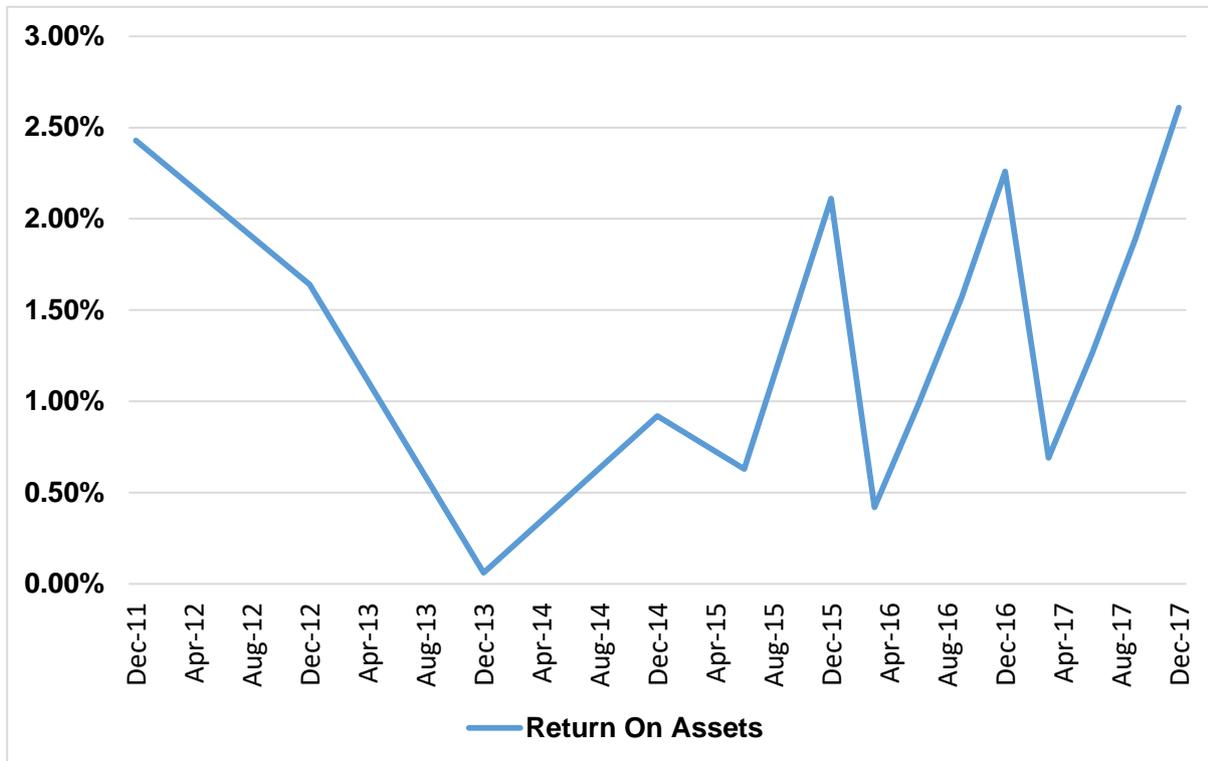
Various commercial banks have started adopting the branchless banking although incompletely in 2009 (Monetary Policy Statement, 2013). Other banks such as Steward Bank and CBZ have converged with mobile network operators especially Econet to practice virtual banking. The service providence by mobile network operators had seemed to be of no relationship with banking services, but to date they are now complements. They complement

one another and it seemed like a bank account holder cannot work without a mobile phone linked to his account.

The use of POS machines in Zimbabwe's banking sector as measured in terms of the volume of transactions has risen immensely by 624.69% from 3,861,062 in 2013 to 27,980,637 as at 31 December 2016. In addition to that, volume of internet banking has increased by 154.79% from 157,978 in 2013 to 402,514 for the financial year ending at 31 December 2016. For all transactions performed using POS machines, both internet banking and mobile has increased as at 31 December 2016 in comparison to the previous years as reflected in the Bank Supervision Annual Report (RBZ, 2016). In that same report, it was reflected that in the vein of the major thrusts underpinning the National Financial Inclusion Strategy, the Central Bank has challenged banking institutions to embrace on technology to spur outreach and enhance access to financial services by its customers. In that regards, the Reserve Bank approved the use of agency banking model and patent Prudential Standards No. 01:2016/BSD: Agency Banking, which serves to proffer direction and guidance to financial institutions especially commercial banks on the minimum required supervisory expectations on the implementation of the so called agency banking model as a branchless banking activity.

As defined by Rengasamy (2012), bank performance refers to the reflection of the way by which bank resources are utilised with the intention to empower and propel it in an attempt to ensure attainability of the prescribed objectives. As a proxy for bank profitability, return on Assets measures the ability of a firm to operate in a profitable way as well as the ability to generate and transform more assets. As indicated in Figure 1.1, trend analysis of ROA Ratio covering the period 2011 to 2017, depicts that between 2011 and 2013, there was a sharp downtrend of the ratio of Return on Assets from 2.43% down to 0.06% as at year end in 2013. The implication and reasons for such trend might be sharp decline in the overall performance of banking sector during that period. Notably in the figure 1.1, there was an improvement in performance thereafter denoted by recovery and steady rise in ROA from a meagre 0.06% in December 2011 up to 2.26% in December 2016. This considerable recovery can be attributed to improvements in key performance indicators which includes capital adequacy ratio, net profit, liquidity ratio, total assets and total deposits, Return on Equity and Non-Performing loans (NPLs) ratio during that course. However, there is no clear reasons to account for such instability in the performance of the banking sector in Zimbabwe and the repercussions of the fluctuations in the general trend as shown in figure 1.1 thus the future

performance of the banks is uncertain. This alone justifies and prompts a study to be carried out in an attempt to account for such kind of trend experienced.



Source: RBZ Bank Supervision Report of 2017

As highlighted in January 2018 Monetary Policy statement, the overall performance rating of Zimbabwe’s banks was considered satisfactory measured at the end of financial year 2017, and this remarkable note was argued to emanate from significant improvements noted in most performance indicators especially liquidity ratio, capital adequacy ratio, net profit margins, total assets and deposits, Return on Equity and ultimately the Non-Performing loans (NPLs) ratio. It was also highlighted in the same report that ROA has considerably increased from 2.26% in December 2016 to 2.61% in December 2017 whilst ROE also rise from 12.64% in December 2016 to 15.48% as recorded in December 2017 implying significant improvement in terms of performance of banks.

Acknowledging trend in ROA as a key indicator of performance in Zimbabwean banking institutions notwithstanding challenges being faced in the sector, the researcher attempts to investigate the level of contribution of various branchless banking activities to such trends aforementioned to bank performance as well as examining whether or not branchless banking

Figure 1.1 Trend showing ROA for Zimbabwe Banking Sector (2011-2017)

activities have any significant contributions on the performance of these banking institutions.

1.2 Problem Statement

There is distress and alarm in the banking sector of Zimbabwe due to the ever changing and unstable profitability levels of the sector particularly after the adoption of various branchless banking activities by various commercial banks in Zimbabwe. There might have some reasons to account for such fluctuations in the profitability measured in terms of ROA. Also, branchless banking activities particularly use of debit cards, use of RTGS and mobile banking are new concepts for commercial banks in Zimbabwe and hence the study of their relationship with banks' profitability is of great concern. Considering the ROA trend which basically shows how satisfactory the banking institutions are, the need to ascertain whether branchless banking activities significantly contributes towards the profitability cannot be overemphasised.

1.3 Objectives of the Study

The main aim of this study is to investigate the relationship that exists between branchless banking activities and profitability of banks in Zimbabwe for the period 2011– 2017. In specific, this study seeks to:

1. To establish the level of contribution of branchless banking activities to the profitability of commercial banks in Zimbabwe.
2. To investigate the role technology has played in profitability of commercial banks in Zimbabwe.
3. To investigate the nature of relationship that exist between branchless banking activities and bank performance.

1.4 Research Hypothesis

The study is based on the following hypothesis:

H₀: There is no relationship between the branchless banking activities and profitability of commercial banks in Zimbabwe.

H₁: There is a relationship between the branchless banking activities and profitability of commercial banks in Zimbabwe.

1.5 Justification of the Study

Although this research project will be submitted in partial fulfillment of the requirements of Bachelor of Commerce Honors Degree in Economics, the research shall be significant in the sense that the researcher benefited by understanding the shape of the modern banking structure it has taken as a result of technological changes. This also helped the researcher in his endeavor of becoming a professional economist due to in-depth intellectual insights on the aspects of the branchless banking activities.

Despite being of prime importance to the researcher, this study will benefit financial institutions by providing information that help them upholding and improving their products and services and their delivery so as to retain customers and boost their profits. The research will also provide secondary data which shall be needed for other studies related to this especially other academics who will be researching on topics related to the one under study. That is the research provides a basis and literature for future researchers on the model of branchless banking. In addition, the study also is intended to benefit the government as well as the regulator of banks in coming up with proper regulation that best suit the financial institutions in as far as the branchless banking activities are concerned.

Considering the flourishing of branchless banking activities, limited studies have been conducted to examine the impact of branchless banking adoption on commercial banks' profitability. Despite the fact that studies have been conducted in developing countries for instance Hernandez-Coss (2009) who examined the impact of introducing banking agents in Mexico, the findings may not resonate well in Zimbabwean case because of certain bank operational differences. Literature has revealed that, various aspects in the banking sector of foreign countries like Kenya has been studied. Examples of such studies are Nader (2011), Shirley and Shushanta (2006) and; Bonface and Ambrose (2015). Given the novelty of mobile banking, agency banking and mobile money in Zimbabwe, there have been no significant research studies in this topic. It is such gaps that motivated the researcher to carry out a study to determine the relationship between adopting the branchless banking activities and banks profitability in Zimbabwe. Therefore, this research study sought to fill in those gaps.

1.6 Delimitations of the Study

There are some considerations that characterises the ability of the researcher to carry out such studies like this. Generally, the intent of carrying this study is to examine the relationship that

exist between branchless banking activities and profitability of commercial banks in Zimbabwe as the conceptual boundary. The study used a sample size of twelve leading commercial banks in accordance of the ratings by RBZ (2018) as well as considering commercial banks which have adopted branchless banking activities for the period in this study. To make this study successful, the researcher also narrowed the branchless banking activities into six major activities which are POS, mobile money, mobile banking and electronic payment systems, RTGS and Debit Cards. The researcher investigates the banking sector of Zimbabwe only. Another capability of this study is related to data collection where data for various variables used in the estimation is readily available in various sources. The research has a limited time frame from 2011 – 2017.

1.7 Study Limitations

There is quite a number of challenges that were faced during the compilation of this research it is the researcher's great concern that neglecting such challenges would limit the precision of the methodology adopted as well as reducing results reliability and validity. The main limitation is that the researcher used only twelve commercial banks to generalise the whole banking sector in Zimbabwe. The topic of this study is too comprehensive for a thorough treatment within the period of three months when the researcher conducted this study. This implies that certain issues will not be given the detailed analysis they deserve and this limits in depth analysis of the study. The researcher had time limit given that the study was carried out within a period of three months and in the same period the researcher was also studying other courses. Financial resources hindered the study to a certain extent that is it has limited the researcher to carry out the research. Some information and data was based on estimates which may have distorted the results of the study.

1.8 Organisation of the rest of the Study

This chapter instigated by broadly introduce the study, outlining brief background upon which the statement problem has been derived from and consequently translated to objectives of the study. In terms of the structure of the study, following this chapter are other distinct four chapters. The second chapter reviews studies that have been done in the area of branchless banking activities. Following this, is the third chapter that will focus on methodology of the study, model specification and justification of the model variables on the basis of empirical research. The fourth chapter will dwell on results presentation and

interpretation. The fifth chapter will be the summary, conclusion and policy recommendations presentations. Finally references and indices shall be presented.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter, existing literature was reviewed on the relationship that exists between the branchless banking activities and profitability of commercial banks. Specifically, in theoretical literature review, the researcher looked at various theories propounded on branchless banking and profitability whilst empirical studies focused on existing researches that has been done on the topic. The concept of branchless banking was further interrogated in this chapter.

2.1 Theoretical Review

In this section, the researcher examines theoretical fundamentals of the relationship that exist between branchless banking activities and profitability of commercial banks that are available in the body of literature. Theories underpinning the concept of branchless banking activity can be classified into three broad categories namely Bank-focused theory, Bank-led and Non-bank-led theory.

2.1.1 Branchless Banking Defined

Branchless banking is basically referring to the channel upon which financial products and services are delivered outside conventional bank branches that is hinged on using ICT to transmit transaction details. Branchless banking acts as a distribution channel which allows financial firms to deliver financial products and services non-traditionally, so called ‘brick and mortar’ bank premises through the use of agents, mobile banking, mobile money and electronic payment systems (Carmel and Scott, 2009).

Examples of branchless banking technologies are typically card-reading point-of-sale (POS) terminals and EFTPOS devices, mobile phones, internet and automated teller machines (ATMs). As argued by Sarah (2012) the adoption of branchless banking activities tends to make financial services accessible non-traditionally that is outside bank branches through the use of technologies that are accessible. Consultative Group to Assist the Poor (CGAP) (2010) defines branchless banking as the use of technology in making payments using cards or mobile phones, in attempt to identify customers as well as enabling recording transactions electronically in addition to initiation of transactions at any place outside bank halls.

2.1.2 Bank Led Theory

The Bank Led theory postulates that a licensed financial institution is expected to deliver its financial services through medium, retail agent. In the thinking, banks develop their products and services on their own, but cannot distribute them on their own but rather through retail agents who then handle the distribution and facilitates customer interaction as envisaged by Lyman *et al.* (2006). This theory argues that the bank is the ultimate provider of products and services and therefore banks play a critical role of maintaining accounts. In line with the fundamentals of this theory, agents have an opportunity to had personally interact with customers for some time (Owens, 2006).

In most countries, the agents had responsibilities over the account opening procedures and could even perform identification as well as service loan customers. Whatever the establishment might be, all agents are snug to communicate and transact electronically with the bank that is providing the product or service in use for which it is working and the equipment, in some instances, a mobile phone or an electronic point-of-sale (POS) terminal can be used since it reads cards. As such, the Bank-led model allows customers to perform transactions at retail agents instead of visiting bank halls or wait in queues for services (Lyman *et al.*, 2006). It is in that note that the bank-led theory is quite relevant to this study since it outlines the used of agents in the delivery of financial products and services. The model also ensures that account and customer relationship rests with the financial institution as the service provider (Tomaskova, 2010).

The researcher discovered that the bank led theory is relevant to this study since its focus is on how banks deliver financial products and services through medium of retail agent, where the financial institution provides products and services, but distribution is performed by retail agents who handle customer interaction. Practically in Zimbabwe, Steward bank uses the notions of the bank-led theory in the distribution of its financial products for example iSave where agents distribute to its customers, since the agents have face-to-face interaction with the Steward Bank customers, performing cash-in and cash-out functions, much as a branch-based teller would take deposits and process withdrawals (Adiera, 1995). CBZ bank distributes its financial products through many supermarkets.

2.1.3 Non-Bank-Led Theory

Unlike the bank led theory, in the case of non-bank led theory clients do neither necessarily deal with a bank as the service provider, nor do they maintain a bank account. The non-bank

led theory allows customers to deal with an outsider, such as non-bank firm which might be either prepaid card issuer or mobile network operator, the role of retail agents is to serve as the reference to customers. Rather, exchange of cash for electronic money by customers is permissible, which is not linked to account in a customer's registered name (Kumar *et al.*, 2006). Due to the aforementioned notion, the model is perceived riskier since there might be circumstances where environment with which these non-banks operate might not give much significance and consciousness to issues related to customer identification which is critical, which may, at some instances, leading to Anti-Money Laundering and Counter-Terrorism Financing (AML/CTF) risks (Kapoor, 2010). It is in that vein that the culture of Know Your Customer (KYC) is a perceived to be a major challenge to this segment (Owens, 2006). The Non-bank-led Theory is quite relevant to this study and can assist the researcher in attaining his objectives simply because it explains how agent acts as intermediaries between bank as a service provider and customers and as such depicts the nature of branchless banking.

2.1.4 Bank-Focused Theory

This theory emerged when traditional banks use non-traditional delivery channels that are of low-cost (cost effectiveness) in providing their services to its customers. Typical examples of such channels includes the use of various branchless banking activities (Kapoor, 2010). Thus, bank focused theory is additive in nature hence may be treated as a diffident extension of traditional branch-based banking. The advantages of this theory includes the fact that it raises the visibility and outreach to the banks concerned although it has some challenges as well in line with the arguments by Bold (2011).

The primary concerns and intents of the customers are mainly to ensure quality of experience, identity security and transactions, reliability as well as accessibility of service and eventually the allowed extent of personalization. To address these issues, financial issues provides branchless banking service which offers easy to use interface, whilst making it secure with the assistance of multi-factor authentication as well as other technologies which are capable of running uninterrupted all the time as Kapoor (2010) indicated. With the use of agent, financial institutions achieved economies of scale due to cost effectiveness in serving customers. The majority of banks in Zimbabwe use Mobile Apps to deliver their financial services for instance CBZ uses CBZ Touch where clients can do their transactions. It is in that vein that the researcher found this theory relevant to this study.

2.1.5 The Technology Acceptance Theory (TAT)

The Technology Acceptance Theory (TAT) outlines the procedures followed by users to first accept the technology and consequentially use it accordingly. As such, TAT is therefore adoption of the Theory of Reasoned Action (TRA) as related to the field of Information System (Lyman *et al.*, 2006). The theory argues that perceived usefulness and ease of use, as perceived, determines the intention by users to use system as well as enabling serving to act as a mediator of accrual system use. TAT suggests quite number of factors that influences the users when making decisions pertaining how and when they shall use the technology (Venkatesh and Bala, 2008). The behavior of the technology users in terms of usage for example the behavior of mobile subscribers (customers) in using a technology (mobile banking, electronic banking and telephone banking) are much predictable if it relies on perceived value of the technology as well as the perceived ease use of it.

It is also key to note the key factors that influence users with the behaviors of how to use new technology; Perceived Usefulness (PU) simply means the degree to which users believe that using a certain technology potentially enhance his or her financial performance (Davis, 1989), Perceived Ease of Use (PEOU) refers to degree to which users believe that they would be free from effort by using a certain technology (Davis, 1989). On another different note, technologies and elements of uncertainty tend to exist in the minds of decision makers with respect to the successful adoption of them, users tend to form attitudes and intentions towards learning and adapting on how to use the new technology prior to initiating efforts directed at using the prescribe technology (Bagozzi and Warshaw, 1992). Since this study is largely hinged on the concept of branchless banking, it is therefore justifiable for the research to include this theory in the body of literature that assist in carrying out this research.

2.1.6 Innovation Diffusion Theory (IDT)

Having been officially introduced by Bradley and Stewart in 2002, IDT theory relates the aspect of innovation to technological advancement. The theory denotes that firms adopt the diffusion of innovation in view to gain competitive and comparative advantage over others, cost reduction and also safeguard their strategic positions. Rogers propounded that IDT explains how an innovation is transmitted and diffused among users over time (Liu and Li, 2009). Basically, the theory provides fundamentals upon which the users' behavior in the determination of whether to adopt or non-adopt an innovation (Lee and Lee, 2003). Rogers

classified users into innovators, early adopters, early majority, late majority and laggards in their order of innovativeness (Liu and Li, 2009).

The adoption of branchless banking activities particularly mobile banking, mobile money and electronic banking pose potential to increase overwhelmingly even in rural areas. Specifically, the research done by Ivatury and Pickens (2006) has proven valuable insight into the adoption of innovativeness with particular emphasis on attributes of the early adopters of WIZZIT, representing one of the major initiatives that are dedicated towards offering mobile banking to the poor in South Africa. By applying the traditional technology acceptance theory and frameworks, the impact of the adoption of branchless banking activities such as mobile banking and electronic banking services can be investigated. Since this study is also underpinned by the concept of financial innovation, this theory is therefore relevant to this study since it postulates patterns around adoption of technology by customers and/or clients.

2.1.7 The Structure Conduct Performance (SCP) Theory

The Structure Conduct Performance (SCP) theory is one of the basic fundamental frameworks used to study the factors that influences the profitability of organisations of a certain industry (Grygorenko, 2009). Baye (2010) defined the paradigm as being the factors such as concentration, technology and market conditions that determine profitability of the bank. He further explained that conduct denotes the behaviour of firms in a certain industry with regards to pricing, promotional mix strategies, and investment in research and development, for examples.

Performance on the other hand refers to the profits and social welfare that arise as resultants and outcomes from participating within a market (Baye, 2010). The paradigm archetype industrial aspects as innately correlated and asserts that market conditions define the firms behaviour. Such behaviour determination help in determining resource allocation in certain ways which then leads to either an efficiency or inefficiency in the market (Baye, 2010). This model has a shortfall in that it does not take into cognisance the notion that performance determines structure and conduct while structure has the potential of impacting both performance and conduct.

Mason (1999) was one of the first scholars to propose that concentration level of the market was a determinant of profits in firms. They established that profits in market conditions

where there is higher market concentration are higher than when it is low. Since the dependent variable of the empirical model of this study is the bank profits, this paradigm is of great relevance because it explores how bank profits can be determined and the factors that might determine the size of the profits with special emphasis on how technology impact profitability.

2.2 Empirical Literature Review

Empirical literature review looked at other related research studies which has been done in Zimbabwe and beyond. This section looks at the researches that attempted to investigate the relationship between branchless banking activities and bank profits across the globe referencing previous studies by other academics and researchers. It also discusses the latest evidence as well as the validation of the existing theories prescribed in previous section on the relationship between branchless banking activities and profitability of commercial banks in different countries.

Shirley and Sushanta (2006) examines the impact of information technology on the banking industry of the United States. The study revealed, theoretically and empirically, the relationship between investments in bank ICTs and profits and the literature has shown mixed concerns on the nature of relationship and impact of technology on bank performance. The researchers collected data from 68 United States banks covering the period of over 20 years. The researchers used the pooled OLS regression analysis to examine the relationship. Major findings of the study were that notwithstanding the notion that IT might lead to cost effectiveness, higher investments in information technology can create network effects lowering bank profits. This finding was opposing the expected findings of the study emanated for the literature. The study concluded that the relationship between investment in information technology and bank profits is conditional to the extent of network strength. In terms of the gap, the researchers did not fully capture any form of branchless banking and dwell much on other systems that are related to financial innovation thus there is a gap since there was no in depth analysis of the concept. Out datedness of the study also limits its relevance to today's context.

Nader (2011) shed light on the impact of technological innovations when researching on the effect of non-traditional banking expansion on profit efficiency of Saudi banks for the period covering 1998-2007. Data was collected to cover the period and for each bank year observations, the data on Net Profit, Assets, Equity, Capital, number of branches, number of

ATMs, number of POSs, availability of Phone Banking, availability of Mobile Banking and availability of PC Banking has been collected. The study was conducted using the Logistical estimation regression method and it was based on the sample size of 6 Saudi commercial banks, out of the 11 working in the Saudi banking market. The study revealed that use of ATMs, mobile banking and agency banking were statistically significant and positively related to net profits. However, POS was statistically insignificant. The gap identified in this study was that it failed to establish and give insight on the cumulative effect of the branchless banking activities included in the empirical model underpins the study. As such, it was not exhaustive since it chooses a sample size of only six banks out of eleven banks and hence the reliability of the results was limited.

Yahaya and Bala (2015) examined the effect of technology and innovation on profitability of commercial banks in Nigeria. Data for the study were extracted from 9 leading commercial banks in Nigeria as cited by the authors. Multivariate OLS regression method was adopted to test the model. In line with the literature reviewed as well as the expected findings of the study, the findings revealed a strong positive relationship between technology and innovation and the profitability of commercial banks in Nigeria. These results conform well with the Bank-Focused Theory thus the study premised on this theory. Sinkey (2002) as cited by Yahaya and Bala (2015) in the literature reviewed was concerned with the Information Technology, as one of the most important issues, which affect the banking performance. The main gap identified in their study is that the authors used a disjointed approach and excluded other crucial branchless banking channels like DCs and POS which are of much relevance in the context of this study.

Bonface and Ambrose (2015), studied the effects of mobile banking on banks financial performance with regards to profitability in Kenya. Their study was driven by the desire to investigate the effects of mobile banking on fourteen commercial banks performance using Kenya banking sector as the conceptual boundary for the study. Bonface and Ambrose study supported that the Bank-Focused Theory emerges when a traditional bank uses non-traditional low cost delivery channels such as ATMs, internet banking and phone or mobile banking as a way of delivering financial services to its customers. The researchers employed a Pooled Logit Model using a general to specific estimation procedure on panel data for fourteen commercial banks in Kenya. From the findings from Bonface and Ambrose (2015) concluded that the prices of mobile banking positively and significantly influence financial

performance. Findings of the study also revealed the existence of strong positive relationship between branchless banking activities included in the model and performance of banks. As a gap from the study, the researchers did not broadly cover all branchless banking activities and as such exclusion of activities such as POS brought the attention that this study should adopt a holistic coverage of all branchless banking adopted by banks in Zimbabwe.

2.3 Conclusion

This chapter looked at the available literature on branchless banking activities in theory and practice with a major emphasis on its relationship with profitability of commercial banks. Case studies drawn from other countries were given and the findings have shown that there is no consensus on the relationship between branchless banking activities and profitability of commercial banks in different countries. That then led to the conclusion that the relationship between branchless banking model and profitability is uncertain hence the zeal to carry out this investigation in Zimbabwe. The next chapter will focus on the research methodology, model specification, justification of variables, data sources as well as appropriate diagnostic checks.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The section documents the research methodology used in collecting data for this study. It examines in detail the model specification and justification of variables, data collection procedures, data types, data sources, diagnostic tests that were performed and finally concludes the chapter. The chapter aimed at transmitting the detail methodological procedures that is showing the steps that was taken in collecting data, the methodological foundations and the reasons behind the researcher's choice of the research methods used.

3.1 Model Specification

Adapted from the argument by Hsiao and Pesaran (2006) that panel data analysis allows for accurate inference of model parameters as well as improving the effectiveness of econometric estimations, the researcher opted for panel data analysis. A model by Yahaya and Bala (2015) who have undertaken a study of similar nature in Nigeria was adapted in order to ensure uncovering of the gap identified in this field of study. Given that the profit is the dependent variable and the various branchless banking activities as independent variables, therefore the empirical static panel model underpinning this study was depicted as follows:

$$ROA_{it} = \beta_0 + \beta_1 DCs_{it} + \beta_2 MB_{it} + \beta_3 RTGS_{it} + \beta_4 TTs_{it} + \beta_5 POS_{it} + \beta_6 IB_{it} + \mu_{it} \dots 3b$$

Where; *ROA* = Return of Assets (ROA) of bank *i* at time *t*, *DCs*= investments in producing and servicing debit and credits cards by bank *i* at time *t*, *MB* = investments in mobile banking by bank *i* at time *t*, *RTGS* = investments in Real Time Gross Settlement by bank *i* at time *t*, *TTs* = investments in telegraphic transfers by bank *i* at time *t*, *POS* = investments in POS terminals by bank *i* at time *t*, *IB* = investments in Internet Banking by bank *i* at time *t* β_0 : the intercept/constant, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 = the parameters and μ = the residual/error term.

3.2 Justification of Variables

3.2.1 Debit/Credit Cards (DCs)

Debit or Credit Cards refers to the plastic card that is connected to a bank account and used to buy goods or services by bank clients as argued by Bold (2011). The use of credit and debit cards in Zimbabwe has increased since the economy was hit by cash crisis (RBZ, 2016). This

variable was measured as total investment in DCs as a percentage of the operating profit of bank i at time t [total investment in DCs /operating profit $\times 100$] (Gichungu and Oloko, 2015). With the aid of POS machines in retails, wholesale and other resorts centers, these cards are widely demanded and used where one can make a payment using a debit or credit card. The cost of producing and servicing credit and debit cards is expected to have a positive impact on bank profits (Nader, 2011)

3.2.2 Mobile Banking (MB)

Tan and Teo (2000) defined mobile banking as an electronic payment banking system that is performed using mobile device such as a phone or a personal digital assistant. This variable is measured as total investment in mobile banking as a percentage of the operating profit of bank i at time t [total investment in mobile phone banking /operating profit $\times 100$] (Gichungu and Oloko, 2015). Mobile banking enables bank customers uses their cellphones to access and transact financial services at the comfort of their homes. The channel enables the customers to view balances in their accounts, top up their airtime and ZIPIT. The bank investments on mobile banking is expected to have a positive relationship with bank profits, in line with the findings of Shirley and Shushanta (2006). In the Zimbabwean context, cash shortages have rendered customers to transact electronically using cellphones. The other fact that makes being that, it plausible to have a positive relationship between mobile banking and bank performance since mobile banking offer much convenience to customers and as such large volumes of mobile banking transactions results hence represent higher returns to banks through commissions, ceteris paribus (Tan and Teo, 2000).

3.2.3 Real Time Gross Settlement (RTGS)

RTGS refers to an electronic payment system that is used to transfer funds locally from one bank to another with the use of swift codes (RBZ, 2013). This variable is measured as total investment in RTGS as a percentage of the operating profit of bank i at time t [total investment in RTGS /operating profit $\times 100$] (Gichungu and Oloko, 2015). Banks used to ask clients to fill in the RTGS form, but due to technological advancement, internet banking is now used to conduct such a payment system. The investment on servicing RTGS is expected to have a negative relationship with bank profits in Zimbabwe (Yahaya and Bala, 2015). This is because ZIPIT has replaced the popularity of RTGS as well as the facilities needed to conduct an RTGS such as internet access.

3.2.4 Telegraphic Transfers (TTs)

Telegraphic transfers, unlike RTGS, are an electronic payment system that is used to transfer funds internationally from a Zimbabwean bank to another bank somewhere outside the country (CGAP, 2010). This variable is measured as total investment in TTs as a percentage of the operating profit of bank i at time t [total investment in TTs /operating profit \times 100] (Gichungu and Oloko, 2015). TTs also make use of swift codes as well through a corresponding bank between the two banks involved. The high costs of using and servicing TTs are expected to have a negative relationship with bank profits (Yahaya and Bala, 2015). This is because although clients resort to using TTs when buying goods and services abroad on online, TTs remained an unattractive way of sending little amounts of money and in some cases, some banks in Zimbabwe have been muting the use of TTs. The proliferation in the use of VISA cards has also reduced the use of TTs.

3.2.5 Point of Sale (POS)

A POS machine as another digital channel is a payment device that enables the holder to make payments at various outlets (RBZ, 2013). This variable is measured as total investment in POS as a percentage of the operating profit of bank i at time t [total investment in POS /operating profit \times 100] (Gichungu and Oloko, 2015). The holders of the cards can do retail payments without using hard cash, perform balance enquiries, airtime vending and even print mini statements of the transactions made (Yahaya and Bala, 2015). The investment on buying and servicing POS terminals is expected to have a positive relationship with bank profits (Bonface and Ambrose, 2015). The argument behind this expectation is the cash shortages experienced in the country which has caused merchants and banks to adopt electronic transactions without any physical hard cash.

3.2.6 Internet Banking (IB)

This represents digital channels which are services and products that enables the bank to leverage on the internet banking system module in-built on the new applications which are implemented by the bank to serve the growing needs of their customers as well as ensure interaction (Yahaya and Bala, 2015). This variable is measured as total investment in internet banking as a percentage of the operating profit of bank i at time t [total investment in internet banking /operating profit \times 100] (Gichungu and Oloko, 2015). The investment on acquiring and servicing internet banking facilities is expected to have a positive relationship with bank profits (Nader, 2011) with the situation in Zimbabwe where people are increasingly using

phones and also participate in various applications offered by their banks such as CBZ touch and ISave.

3.2.7 Error Term (μ_{it})

Error term usually means that the model is not completely exact (Gujarati, 2004). In that note, the researcher included the error term to capture other variables not included in the model of but having a significant effect on ROA.

3.3 Study Population and Sample

The researcher used twelve commercial banks in Zimbabwe namely Barclays, FBC, Steward, CBZ, AgriBank, NMB, ZB Bank, MBCA, MetBank, Ecobank Banc ABC and Stanbic because they are perceived to have adopted the technological innovations and has been operating from 2011 to 2017 as indicated in the Bank Supervision Annual Report published by Reserve Bank of Zimbabwe, 2013. The selected banks comprise a significant market share of the banking industry with reference to its total deposits, net assets, shareholders' funds, deposit accounts and loan accounts. These banks were selected simply because of the required data for the purpose of this study information was readily available and the data is easily provided and disclosed. Most of the selected banks have departments such as Operations department and the E-banking department which also helped in data collection.

3.4 Data Type and Sources

As indicated in the research designed, this study is purely quantitative in terms of methodology and it depend on micro panel data in an attempt to achieve the set research objectives. Boslaugh (2012) stresses that secondary data collection method is relatively more economic and it saves time because the data is readily available although the data needs to be fully and accurately scrutinized in order to get significant results. Notwithstanding the fact that secondary data has its own inadequacies, it has been considered more appropriate for this research. The researcher will use financial statements of selected banks from 2011 to 2017 as secondary sources of data to come up with a detailed analysis of the trend in the banks' financial profits from the adoption and servicing (bank investments) of mobile banking, RTGS, TTs, credit/debit cards and other digital channels denoted as internet banking in the model. The researcher also made use of secondary data that was collected from selected banks' Digital Channels Cost Control Accounts and reports, the related journals, books, and internet materials. Analysis of existing data will be efficient and economical to save time.

The study covered the period, 2011 to 2017 and twelve commercial banks were selected to represent the sample (See Table 3.1).

Table 3.1 Studied Banks used in Analysis

BARCLAYS	CBZ	FBC
AGRIBANK	NMB	STEWARD
ZB BANK	BANC ABC	STANBIC
MBCA	METBANK	ECOBANK

Source: www.rbz.co.zw

3.5 Static Panel Model Diagnostic Tests

The data set is the combination of different characteristics for a period of time (time series) in different individual banks (cross sections). So time-series and cross-sectional data define the panel data (Gujarati, 2004). In this study, the researcher used panel data. Baltagi (2005) also argues that merging time series and cross-section observations, panel data is formulated. Key thrusts behind the choice is that panel data; is more informative, offers more variability, ensure that there is less collinearity among variables, provides more degrees of freedom and there is more efficiency. In this study, the researcher adopts short panel data because the number of cross-section subjects, N , which is 12 outweighs time periods, T , which is 7. The panel is also balanced since cross section observations has the same number of observations. Static panel data model is the one that is more appropriate to estimate the co-efficiencies of the regressors when the cross-sections, N , is large and the series, T ; is small and fixed (Plumper and Troeger, 2007). It is against this argument that the researcher used static panel model. Before a panel data model is estimated, it is important to make diagnosis of the data in order to ascertain whether it is free from econometric problem so as to ensure precision, guarantee efficiency property, constituency and results reliability (Dzingirai, 2015).

3.5.1 Panel Unit Root Test

The researcher conducted a unit root test on all variables which forms the model in order to determine its stationarity status. Brooks (2008) asserts the need to ensure that all variables included in the model are stationary and if there are one or more variables that are non-stationary, they should be given different treatment since combining stationary and non-stationary series can compromise and limit precision its of certain data properties. The

researcher used the Levin-Lin-Chu (LLC) Test was used to test the stationarity status of the variable. The researcher chose LLC because Levin *et al.* (2002) has indicated that their approach is more appropriate for panels of small and moderate size (*i.e.* $10 < n < 250$). Barbieri (2006) further argued that existing unit root test procedures using Levin-Lin-Chu method are appropriate if T is less than N . It is against this background that the researcher chooses the LLC test in this study. If the panels are small or moderate, multivariate procedures may not be sufficiently powerful if one uses the Fischer and Pesaran tests, and the LLC test might be best approach to use for small to moderate. Non-stationary condition implies that the variable suffers from a unit root problem. As such, all the variables have been tested for stationarity until it becomes stationary and the order of integration is determined. The hypothesis was stated as follows.

H₀: There is no stationarity ($\rho=1$)

H₁: The variable is stationary ($\rho<1$) (one tailed test)

The decision rule was stated as non-rejection of null if the p value is greater than 0.1, otherwise reject null. The p -value of 0.1 was used because the test is one tailed test as indicated in the alternative hypothesis.

3.5.2 Hausman Specification Test

Wooldridge (2002) states that there are two types of effects to be investigated that are “random effect” and a “fixed effect”, where the former means no correlation between exogenous and the unobserved effect; while the latter means there is correlation between the observed explanatory variables and the unobserved effect is not zero and thus it is allowed. Fixed effect model allows the control of other factors that might correlate with the exogenous variables. Using the Hausman’s test, the researcher compares the random effects model to the fixed effects models to determine the appropriate model to use. The test differentiates between fixed effects and random effects in the panel data. Since random effects signifies higher efficiency under this test, it resonates well with the null hypothesis. The Hausman Test assist in detecting endogenous regressors in the model (Green, 2012). Thus it is of greater relevance in ensuring consistency and reliability in the determination of the appropriate model. The hypothesis statement was stated as follows:

H₀: Random Effects Model is suitable

H₁: The Fixed Effects model is suitable

The decision rule was stated as non-rejection of null if the p value is greater 0.05, otherwise reject null.

3.5.3 Breusch Pagan Lagrangian Multiplier (BPLM) Test

The Breusch Pagan Lagrangian Multiplier (BPLM) test is used to determine whether the pooled OLS or the random effects model is appropriate for the data. It is very basic process that is used when there is panel data analysis in order to control individual heterogeneity and enhance results reliability (Gujarati, 2008). If the results show that pooled OLS regression is appropriate, the researcher will simply pool the observations, ignoring its cross-sectional properties because theoretically and assumedly the error term captures everything. This will camouflage the heterogeneity as well as individuality that might exists between the variables underpinning the model (Hill *et al*,2007) The researcher used Breusch and Pagan test to see whether to use pooled OLS or random effect model.

The rationale behind the selection of Lagrange Multiplier (LM) test is that it is argued that the test provides standard means of testing parametric restrictions (Green, 2012). Its primary advantage over other tests (Likelihood Ratio (LR) and Wald) which can be alternatively used is that the LM statistic is computed based on the results of the null only, thus the restricted model, which is perceived to be simpler than unrestricted model. Suppose the null gives the results that parameter tested lies within the boundary of the parameter space, the LM test does not lose its standard distributional properties which might be the case for other tests. The hypothesis statement was stated as follows:

H₀: Pooled OLS model is suitable

H₁: The Random effects model is suitable

The decision rule was stated as non-rejection of null if the p value is greater 0.05, otherwise reject null.

3.5.4 Model Specification Test

Post estimation checks of the model to determine whether the correct functional form has been adopted, that is, whether error of measurement was not committed and model misspecification or specification error was not committed, it is advisable to carry out the Ramsey RESET test (Hsiao, 2003). When carrying out this test the null hypothesis of correct model specification is carried out against the alternative of model misspecification. The hypothesis statement was stated as follows:

H₀: the model is correctly specified

H₁: the model is not correctly specified

The decision rule was stated as non-rejection of null if the p value is greater 0.05, otherwise reject null.

3.5.5 Multicollinearity Analysis

As Gujarati (2008) asserts, multicollinearity is the presence of linear correlation between exogenous variables of a regression model and the definite effects of that will be large variance and covariance being observed, and this makes precise estimation tough. Apart from that, presence of serious multi collinearity widens the confidence interval whilst broaden the likelihoods of committing type II error which means non rejection of the null hypothesis that the true population coefficient is not significantly different from zero, when hypothetically it has to be rejected. Presence of multicollinearity invalidates the ceteris paribus assumption in the interpretation of the parameters estimated. This will render the essence of variable interpretations contemporaneous (Dzingirai, 2015). Presence of correlation coefficient of 0.8 or greater shall be a reflection of the model suffering from severe multicollinearity (Maddala and Lahiri, 2009). A correlation matrix was used in this study.

3.5.6 Heteroscedasticity Test

Heteroscedasticity problem arises when error variances are not constant such that it violates the efficiency property of linear regression (Gujarati, 2008). Inefficient estimators for small and large samples normally happens if the model is suffering from heteroscedasticity. In this case, it produces coefficients which are not Best Linear Unbiased Estimators (BLUE) despite being linear and unbiased (Gujarati, 2004). To test whether there is homoscedasticity or heteroscedasticity of the error terms in the model, the Breusch-Pagan-Godfrey (BPG) test was adopted. The Breusch-Pagan-Godfrey (BPG) test regresses the squared residuals on the original regressors by default and it is a strength over White test which could be otherwise used (Gujarati and Porter, 2009). The BPG test for heteroskedasticity is based assumption linearity of original regressors. The hypothesis was stated as follows:

H₀: There is homoscedasticity

H₁: There is heteroscedasticity (two tailed)

The decision rule was stated as non-rejection of null if the p value is greater 0.05, otherwise reject null and conclude that the empirical model is homoscedastic.

3.6 Conclusion

The chapter outlines the methodology and procedures that drive towards the attainment of objectives and ensure accuracy of results. It covered methods and procedures used by the researcher in collecting data. That is the research design, research model, data collection the statistical tests, study population and sample and procedures that were used in collecting information for the success of the research undertaking. The researcher has adapted the model from the one used by Yahaya and Bala (2015). Various diagnostic tests were performed in an attempt to ensure data validity. The next chapter will focus on data presentation and analysis.

CHAPTER FOUR

RESULTS PRESENTATION AND ANALYSIS

4.0 Introduction

The purpose of this chapter is to present and interpret research findings. As such, focus is on results presentation, interpretation of the findings and discussion as guided by the research methodology outlined in Chapter 3. Data analysis and interpretation was performed in tandem with objectives of the study. The results from the estimations were also presented. Descriptive statistics results, diagnostic tests result and panel regression results with their interpretation were presented. To perform the diagnostics and the estimations, the researcher used a computerised statistical package, Stata Version 13.

4.1 Descriptive Statistics Results

This section seeks to give purview of observation of variables used in this study for the period in consideration with reference to standard deviation, mean, minimum and maximum statistics. The descriptive statistics simply outlines the key features of the data used for the estimation and the basic characteristics that it portrays according to Maddala and Lahiri (2009). These results are important especially in determining the distribution, measure of central tendency as well as determining the dispersion of the data used for the estimation as argued by Boslaugh (2012). Table 4.1 shows the summary results of the descriptive statistics as obtained from the data used in this study.

Table 4.1 Descriptive Statistics Summary Results

Variable	ROA	DC	TTs	RTGS	MB	POS	IB
Obs.	84	84	84	84	84	84	84
Mean	5.18631	19.61769	6.75214	15.53833	9.396429	58.02893	22.82333
Std. Dev.	4.547814	0.6045382	5.871998	7.93449	5.389311	32.90109	20.37634
Min	-6.9	18.0828	0.5	1.7	1.79	0.05	0.6
Max	19	21.2337	25.397	34.6	29.6	98	76.7

See Appendix 2

The performance of commercial banks as measured in terms of ROA has an average of 5.186% per year for the period used in this study. This performance is relatively low but

encouraging since its positive and hence signifies considerable profits being made as shown in Table 4.1 by ROA. The mean and standard deviation steadily falls within the range between the maximum and minimum values showing a higher degree of consistency (Boslaugh, 2002). Besides, the standard deviations for most of the variables data are fairly low except for POS and IB.

4.2 Diagnostic Test Results

The diagnostic tests were conducted in order to determine whether the data placate crucial econometric assumptions so as to guarantee the efficiency, constituency and results validity and reliability. Amongst the tests which were performed are panel root tests, hausman test, Breusch Pagan LM test, heteroscedasticity test and multicollinearity test.

4.2.1 Panel Unit Root Test Results

Levin –Lin –Chu test approach was employed to perform unit root tests. Hypothesis statement was stated in Chapter 3 was used and the stationarity condition was in favour of alternative hypothesis. Table 4.2 shows the summary of the results, indicating the order of integration for all the explanatory variables included in the empirical model underpinning this study.

Table 4.2 Panel Unit Root Test Results

Variable	<i>t</i> -Static	<i>p</i> -Statistic	Order of Integration
Debit Cards (DC)	-4.8167***	0.0001	I(0)
Mobile Banking (MB)	-3.9752***	<0.0001	I(0)
RTGS	-4.0928***	0.0043	I(0)
Point of Sale (POS)	-7.6849*	0.0951	I(0)
Telegraphic Transfers (TTs)	-21.7004***	<0.0001	I(0)
Internet Banking (IB)	-5.8828***	<0.0001	I(0)

*See Appendix 3. Note that ***, ** and * represents 1%, 5% and 10% level of significance respectively.*

As outlined in the previous chapter under methodology, a variable is said to be stationary if the *p*-value less than 0.1 since it is a one tailed test. From the results shown on Table 4.2, the

researcher rejects null hypothesis at level for all the variables, that is, all variables were denoted as integrated of order zero since the p values were found to be less than 0.1 without any differencing. It can be interpreted that all the variables were found to be stationary at level. Gujarati (2008) asserts that if the variables in a series are integrated of the same order like the case in this study where all variables were integrated of order zero, we assume that the variables are co-integrated and they move in the same wavelength. This therefore implies existence of a long run equilibrium between the variables.

4.2.2 Hausman Specification Test Results

The Hausman Specification test was conducted to test whether random effects model or fixed effects model was appropriate. The test procedure was fully outlined in Chapter 3. The null hypothesis was in favour of the random effects model against alternative hypothesis that was in favour of fixed effects model. The decision criteria were non rejection of the null if p -value is greater than 0.05 and conclude that the random effects regression model was suitable. The results of the test are shown on Table 4.3.

Table 4.3 Hausman Specification Test Results

Chi 2(6)	Probability>Chibar2
10.39	0.1091

See Appendix 4

The p -value in table 4.3 is greater than 0.05 providing non rejection of the null hypothesis and leads to the conclusion that the random effects model was most suitable. This result signifies that differences in co-efficiencies were not systematic.

4.2.3 Breusch Pagan Lagrangian Multiplier (BPLM) Test Results

The researcher used the Breusch Pagan Lagrangian Multiplier (BPLM) test to determine whether the pooled OLS was appropriate at the expense of the random effects model. The test procedure was fully outlined in Chapter 3. From the results obtained the decision was stated as non-rejection of the null if p -value is greater than 0.05 and the researcher did not find enough reasons to reject the null hence the conclusion that the Pooled OLS regression model was suitable for the model. The results are shown in table 4.4.

Table 4.4 BPLM Test Results

Chi 2(01)	Probability>Chibar2

1.97	0.0804
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See Appendix 5

From the results shown on Table 4.4, the p -value is greater than 0.05 providing non rejection of the null hypothesis and conclude that the pooled OLS was most appropriate for the data.

4.2.4 Model Specification Test Results

The test was performed to ascertain whether the researcher correctly specified model or not. Ramsey Reset test was employed. The p value of 0.1286 obtained is greater than 0.05, the decision was stated as non-rejection of the null and conclude that the model was correctly specified. This result implies that the model was accurate and its application is significant in predicating the results. Table 4.5 shows the results obtained from the test.

Table 4.5: Ramsey Reset Test Results

F (3, 82)	Prob > F
1.95	0.1286

See Appendix 6

4.2.5 Multicolleniarity Analysis Results

The researcher used the correlation matrix to determine whether the model suffers from severe multicollinearity or not. The correlation matrix in Table 4.6 shows the results.

	DC	TTs	RTGS	MB	POS	IB
DC	1.0000					
TTs	0.1323	1.0000				
RTGS	0.0014	0.0320	1.0000			
MB	0.2730	0.3693	0.3326	1.0000		
POS	0.1120	-0.6255	-0.1990	-0.2621	1.0000	
IB	0.0939	0.2354	-0.0883	0.1334	0.0867	1.0000

Table 4.6 Correlation Matrix

See Appendix 8

Since all the correlation coefficients (r) in the matrix are less than 0.8 the researcher concluded that the model was free from severe multicollinearity and as such, it satisfies the econometric assumption of no severe multicollinearity.

4.2.6 Heteroscedasticity Test Results

The Breusch Pagan-Godfrey (BPG) test was employed. The p -value obtained was greater than 0.05 and the decision was stated as non-rejection of the null and conclude that the model was homoscedastic. This result implies constant variances among disturbance terms. Table 4.7 shows the results obtained from the test.

Table 4.7: Heteroscedasticity Test Results

Chi-2(1)	Prob > chi2
0.07	0.7931

See Appendix 7

4.3 Regression Results Presentation and Interpretation

After all the necessary diagnostic tests has been performed as well as addressing the appropriate data irregularities, the statistical package, Stata Version 13 was used to carry out the regression. Results and findings that were obtained are presented hereafter. Table 4.8 shows the pooled panel regression results. The p value approach was adopted in ascertaining whether the parameters were statistically significant or not. Hypothesis statement was stated as follows:

H_0 : Coefficient is not statistically significant

H_1 : Coefficient is statistically significant

The decision criteria were stated as non-rejection of H_0 if p -value is greater than 0.05 otherwise reject the null and conclude that the variable is statistically significant.

Table 4.8: Panel Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-32.73502	13.27731	-2.47	0.016
Debit Card (DC)	1.838781***	0.698043	2.63	0.010
Telegraphic Transfers (TTs)	0.0133643	0.0976484	0.14	0.891
RTGS	0.1234382**	0.0539708	2.29	0.025
Mobile Banking (MB)	0.2430059***	0.0863437	2.81	0.006

Point of Sale (POS)	-0.042804**	0.0169027	-2.53	0.013
Internet Banking (IB)	0.0017924	0.0208022	0.09	0.932

See Appendix 9. Note that ***, ** and * represents 1%, 5% and 10% level of significance respectively.

N = 84

Adjusted R² = 0.3893

R² = 0.4335

Root MSE = 3.5538

F (6, 77) = 9.82

After running the regression, the model was therefore specified as

$$ROA_{it} = -32.735 + 1.839DCs_{it} + 0.243MB_{it} + 0.123RTGS_{it} + 0.013TTs_{it} - 0.043POS_{it} + 0.002IB_{it}$$

(Note: The coefficients in the estimated equation above are rounded off to 3 decimal places)

The regression results of this study was interpreted using the size of the coefficient as well as the nature (+/-) of relationship that exists between endogenous variable (ROA) and the predetermined variables that formulates the model used in this study. The implication of the *p* values was also inferred in line with the significance status of the parameters. The results analysis and implementation was grounded on theoretical and empirical suppositions and hypothesis.

4.3.1 Co-efficient of Determination

The coefficient of determination helps to determine the goodness of fit of the model. As such the co-efficient of determination was found to be 0.4335 implying that about 43.35% differences in profits of commercial banks is attributable to the explanatory variables, at 95% confidence interval, that are available in the pooled panel regression model used in this study. This implies that the model explains the changes in bank profits adequately though its below 50%. The remaining 56.65% variations is attributed to other variables outside the model and hypothetically, the error term captures all the variables outside the model specified as it is assumed to be white noise. Adjusted R² was found to be 0.3893 implying 38.94% variations in ROA being explained by the variables in model after adjusting for degrees of freedom. The R² of 43.35% signifies considerable impact of branchless banking activities included in the model and thus cannot be ruled out in decision making by commercial banks in Zimbabwe.

4.3.2 Debit Cards (DCs)

The coefficient of debit cards of 1.839 implies that there is a positive relationship between investment in debit cards and bank profits. A unit increase in investment on issuing debit cards will lead to a 1.84 units increase in bank profits, which is more than proportionate change, holding all other variables constant. An observed p -value of 0.010 which is also less than 0.05 implies that debit cards variable was found statistically significant in effecting variations in bank profits at 5% significance level. The findings on this particular variable resonates well with what the researcher expected. Increase in the investment in debit cards by banks tend to bid economies of scale since it offers convenience which then leads to increase in the volume of transactions processed at a given time and thus it improves overall efficiency and performance by lowering costs Nader (2011). The finding resonates well with the outcomes from the researches by Nader (2011) and Yahaya and Bala (2015).

This is so because nowadays in Zimbabwe, the use of debit cards in making payments for goods or services has become dominant and is continuing increasing. People have resorted to using plastic money when transacting because of liquidity and cash shortages in the country. People can transact in shops using credit and debit cards instead of using hard cash and there is high interest obtained by banks through charges imposed per transactions and as volume of transactions increases this intend to improve the performance of banks in line with the findings of this study.

4.3.3 Mobile Banking (MB)

Mobile banking has a coefficient of 0.243. This means that investment in mobile banking in commercial banks positively affect profits. In addition to that a unit increase in investment in mobile banking will lead to a 0.24 units increase in bank profits. Mobile banking has a p value of 0.006 at 5% significance level which implies that the variable is statistically significant in effecting bank profits of commercial banks in Zimbabwe. This result falls within the confines of what was expected from this study. It also resonates well with the Bank- focused theory which postulates that mobile banking will lead to higher profits due to easy transfer of finances from one account to another, airtime subscriptions and transfer of funds from bank accounts to mobile phones through a service called ZIPIT (Shirley and Shushanta, 2006). In addition to that, by having a large volume of investment in mobile banking, commercial banks are excused from cash shortages that has rendered bank clients to transact using cellphones more profitably (Chikoko *et al*, 2012). This finding is in line with

the conclusions made by Yahaya and Bala (2015) who also found a positive effect of mobile banking to profits in case of Nigeria commercial banks.

This means that increase in mobile banking branchless banking channel service result to more transactions carried out by customer simultaneously as well as avoiding long queues in bank which made more customers to use banking services therefore increasing the commission target of the banks and increasing profit of the bank as the number of transactions increase. Most Zimbabweans are now using mobile phones when transacting since mobile banking offers convenience, safety as well as flexibility in transacting. With mobile banking, bank customers can perform transactions in the comfort of their homes and such convenience is of paramount importance to customers for instance money transfer, buying airtime, paying bills such as ZINWA, paying for ZESA and DSTV subscriptions. The overall value of using mobile phones to banks might be increasing the commission target of the banks and increasing profit of the bank as the number of transactions increase.

4.3.4 RTGS

The size of the coefficient of RTGS has found to be 0.123. This result can be interpreted as a unit increase in investment in RTGS will lead to a 0.12 units increase in bank profits, which is less than proportionate change, holding all other variables constant. The results show a positive impact as well as significant effect of RTGS on bank profits. RTGS has a *p* value of 0.025 which is also less than 0.05 at 5% significance level. This shows that RTGS is statistically significant in explaining bank profits. This result opposes the researcher's expectations in the beginning of the research since the researcher expected a negative impact of RTGS on bank profits. However, Gichungu and Oloko (2015) obtained similar results to these as they found that RTGS was positively correlated with profits and concluded that clients continued to use and trust RTGS to transfer funds despite technological advancement where internet banking was used to conduct such a payment system. This is attributed by the fact that as technology improves; many bank customers are able to transact using funds transfer channels as the speed of transaction improves thereby making the bank to earn more profits from this branchless banking channels due the commission charged per transaction done. This is also the case in the Zimbabwe banking sector context as highlighted in the RBZ Banking Sector Supervision Report of 2017 and this justifies the finding of this study. However, this result is opposing the findings of Nader (2011) who found that there is high cost of servicing RTGS with the swift codes hence it was found to be negatively related to bank profits in the case of Saudi banks.

4.3.5 Point of Sale (POS)

The results show a negative but significant effect of POS on bank profits. A unit increase in investment in POS will lead to a 0.04 units decrease in bank profits, as evidenced by the results obtained in this study. The p value of 0.023 is less than 0.05 at 5% significance level which shows that POS is statistically significant in explaining bank profits. This result did not come as expected by the researcher as he expects positive relationship between POS and bank profits. However, it is in line with the findings of Mamatzakis, Zhang and Wang (2017) and Malik, *et al.* (2015) who found that POS is negatively correlated with profits and concluded that banks with more POS machines perform poorly due to servicing and network requirements that are associated with POS banking system. However, this result is opposing the findings of Bonface and Ambrose (2015) who found that there is POS terminals are positively correlated to bank profits especially in cases where there are cash shortages that render merchants and banks transact electronically in the case of Kenya.

4.3.6 Telegraphic Transfers (TTs)

The p value of 0.891 observed on this variable was far above 0.05 at 5% significance level thus it resonates well with the null hypothesis. This result can be interpreted as telegraphic transfers does not significantly impact bank profits in line with the findings of this study. It is in that vein that the researcher did not comment much about the variable due to its insignificance.

4.3.7 Internet Banking (IB)

Similarly, to telegraphic transfers, the p value of 0.932 observed on this variable was far above 0.05 at 5% significance level thus it resonates well with the null hypothesis. This result can be interpreted as internet banking does not significantly impact bank profits in line with the findings of this study although it has a positive impact as expected. It is in that vein that the researcher did not comment much about the variable due to its insignificance.

4. 4 Conclusion

The just ended chapter provide interpretation of the results obtained by the researcher and the results were compared with the highlights of the literature that forms the basis upon which this study was conducted. Results on descriptive statistics, diagnostic tests and pooled regression were presented and interpreted in line with the topic. Generally, the results have shown that four variables (mobile banking, debit cards, RTGS and POS) were statistically significant in explaining changes in the bank profits although POS was found to be negatively

related to ROA as opposed to the expected result. Internet banking and Telegraphic Transfers were found insignificant. Generalising the findings, branchless banking activities are highly significant on bank profits especially mobile banking and debit cards thus justifies the necessity for this study despite insignificance of other two variables aforementioned. Following this is the last chapter which wrap up the study by giving summary of the findings of this study, conclusions that were drawn from the findings, recommendations based on major findings and eventually the suggestions for future studies.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter provides a synopsis of an investigation into the branchless banking activities' relationship with profitability of commercial banks with exclusive reference to Zimbabwean commercial banks. The chapter delivers an abridgement of this study from the research gap, objectives, findings as well as the recommendations and conclusions.

5.1 Summary of Findings

Key objective of this research was to investigate the relationship that exists between various branchless banking activities adopted by commercial banks and the profitability of these banks in Zimbabwe. The reviewed literature has shown that some branchless banking activities were statistically significant whilst others were found to be insignificant. Also, the nature of relationship (signs) were different amongst the empirical studies reviewed in various countries across the globe. Thus, the results from literatures reviewed were somehow differed in the forms of branchless banking activities that were found statistically significant in determining profits.

This study reviewed that the major forms of branchless banking activities that have been adopted by banks in Zimbabwe are debit cards, mobile banking such as the use of mobile phones to execute bank transactions like paying bills, mobile money such as the use of Ecocash linked to debit cards, use of RTGS, ATMs, debit cards and telegraphic transfers. Using pooled OLS regression method, the researcher found out that mobile banking, debit cards, RTGS and POS banking were significant forms of branchless banking activities that explains changes in bank profits as reflected by the significance of co-efficiencies. However,

POS has found to be negatively related to bank profits. Telegraphic transfers and other internet banking products and services were statistically insignificant in determining profits in line with the findings of this study.

The results of the study that adopting the branchless banking activities by banks positively or improved performance of banks in Zimbabwe as reflected by the size of the co-efficiencies and also the magnitude of the observed co-efficient of determination, notwithstanding the fact that other variable (internet banking and telegraphic transfers) were found to be insignificant. It is evidenced that embracing the use of ATMs and debit cards for withdrawing cash reduced the time taken by bank tellers to serve clients as well as workload which improved their effectiveness and efficiency hence reflected in improved bank performance. Also, the use mobile money such as transferring cash from bank account to Ecocash debit card and then making payments via Ecocash agents reduced workload to bank personnel. The use of mobile apps to execute RTGS, paying school fees, paying bills such as Zesa and DSTV subscriptions proved to have a positive effect on bank performance.

5.2 Conclusions

This subsection shows the researcher's conclusions of this research study based on the findings of the study as compared to those of other researchers reviewed in the literature. In as far as the forms of branchless banking activities are concerned, the researcher concluded the mobile banking and other electronic payment system presented forms of branchless banking activities that the Zimbabwean banks have adopted so far. The researcher's conclusion on the nature of branchless banking activities adopted by banks corresponded to those of Agboola (2006) and Nader (2011) who also concluded that the same regarding the nature of branchless banking activities adopted by banks.

From the study, the researcher concluded that there is a strong positive relationship that exists between branchless banking activities and profitability of banks in Zimbabwe. This meant that many of the forms of branchless banking activities have positive effects on profitability of banks. The researcher also concluded that this positive correlation between the branchless banking activities and profitability emanated from the advantages that outweighed the disadvantages of branchless banking activities to banks hence reduced costs at the height of increased clientele base clearly translated into increased profitability of banks. The above conclusions were more or less the same as those of Shirley and Sushanta (2006) and that of Nader (2011).

On the same note, the researcher concluded that majority of the forms of branchless banking activities underpinning this study have a positive relationship with performance of banks. The researcher then concluded that banks that have adopted the branchless banking activities in Zimbabwe have relatively better performance because the relationship observed on this study. Thus this conclusion was on the same wave length as the conclusions by Bonface and Ambrose (2015) and those of Yahaya and Bala (2015)

5.3 Recommendations

The recommendations that were made to the bank were based on the conclusions that were drawn above as well as significant variables observed in this study. These recommendations were made so as to ensure that decrease in profitability levels will become a thing of the past through an efficient and effective implementation of the branchless banking activities that are acceptable and offer maximum convenience to the customers backed by the results of this study.

Shifting from traditional banking activities to branchless banking activities (Debit Cards, Mobile Banking, RTGS)

From the findings and conclusions, the researcher recommends that commercial banks in Zimbabwe should shift their focus from traditional brick and mortar banking activities to branchless banking activities that were found positively related to bank profits (Debit/credit cards, mobile banking and RTGS) and enhance management of the key these branchless banking activities which include RTGS, debit cards and mobile banking as these proved to have a positive relationship with bank profitability.

Increasing awareness and financial literacy to improve effectiveness of branchless banking (Mobile Banking and Debit Cards)

In addition, banks are recommended to upscale their marketing efforts by instigating awareness raising programs to instil interest in branchless banking activities such as the use of mobile banking and debit cards. This will help increase financial literacy rate in the country since the majority of users of the branchless banking are people from the urban areas relative to people living in rural areas. For example, people in rural areas should be made aware that they can access banking services using their mobile phones at comfort of their homes. Given that branchless banking promotes financial inclusion, this will help banks to increase their clientele base which is a determinant of profitability through non-interest income.

Investment in information and communication technologies (ICT) (Mobile banking, POS and RTGS)

The researcher recommends that the banks in Zimbabwe should continue to adjust to branchless banking activities and new technologies which enhance effectiveness and convenience delivery of financial services which will improve their profitability particularly mobile banking, RTGS and RTGS which needs strong networks to ease transactions. The continuous upgrading of banking systems and delivery systems promotes efficiency in the banking industry in as far as branchless banking activities are concerned. With improvement in ICTs, POS will end up being positively related to bank profits. The RBZ has recently encouraged banks to upgrade their core banking system. The net result is the reduction in the cost of product and service delivery which will be passed to the banking public in the form of lower charges notwithstanding the cost considerations by banking institutions that will be offset by the cost advantages gained from efficient and automated processes.

Building strong relations with internet service providers and mobile network operators (Mobile Banking)

In an attempt to continuously upgrade internet and mobile networks by banks, they should build and maintain good and strong relations with companies that provide internet services as well as mobile network operators in Zimbabwe. Good relations with such companies will go a long way in ensuring that internet and mobile network is available all the time to support customers' internet and mobile banking transactions as well as making sure that POS machine networks are always up in every shop. The resultant impact will be the improvement in bank performance in terms of return of assets.

This idea also augments the ability of banks to invest and upgrade its information and communication technologies. The benefits of interoperability and network sharing between banks and the telecommunication companies cannot be ignored under the cash crisis era in Zimbabwe. Most banks have merged their customers' accounts with Ecocash, one of Econet's most competitive products so that one can move funds from bank account into wallet account or the reverse. Such mobile banking platform has a bearing on the performance of banks as evidenced by the positive relationship and mobile banking obtained in this study.

Recommendation to the financial sector regulators and government policy makers

The researcher also recommends that the financial sector regulators especially the central bank and other likeminded institutions and government policy makers should review the policies pertaining adoption of branchless banking activities particularly the ones that are positively related to bank profits (mobile banking, debit cards and RTGS). The government should encourage adoption of innovation in branchless banking that will improve the income streams of profitability of the banks. The policy makers should note that branchless banking activities such as mobile banking, RTGS and debit cards have facilitated flow of money and hence a noticeable increase in balances in the Nostro accounts relative to Vostro accounts.

Branchless banking through mobile banking appeals to policymakers and regulatory authorities since it has the potential to extend financial services to unbanked population and marginalized communities. Therefore, the government through central bank should increase investments in education, infrastructure development to enable financial firms and consumers to adopt the branchless banking activities especially those found significant in this study.

5.4 Recommendation to further research studies on this topic

This research was focusing on the evaluation of the relationship between branchless banking and profitability of banks in Zimbabwe using a case of commercial banks in Zimbabwe. The researcher recommends that further studies should be done on a similar topic but however using different methodology, focusing on other banks such building societies and microfinance institutions than the ones used in this study. Notably the findings that will be attained from other research studies will be helpful to the policy makers and to studied commercial banks in determining and formulating the strategies on how best the branchless banking activities can be implemented so as to increase bank profits.

5.5 Conclusion

Commercial banks are key navigators of the financial sector and as such they play pivotal role in economic growth and development and structural transformation of the economy. The need for authorities to review the regulatory policies put in place specifically for adoption of branchless banking operations in terms of security cannot be overemphasized. The playing field for all financial institutions should be conducive enough and should encourage the adoption of branchless banking activities especially the ones found significant. It is the researcher's confidence and credence that implementation of the recommendations that were proffered in this research will go a long way in nurturing a strong setting for commercial banks to operate efficiently and effectively and overallly spurs growth of the economy.

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APPENDICES

Appendix 1: Data Set

BANK	TIME	ROA	DC	TTs	RTGS	MB	POS	IB
1	2011	6.2	19.0441	18.347	3.9	12.41	3.41	5
1	2012	4.5	19.1334	10.2655	7.7	14.5	1.94	9
1	2013	0.8	19.4096	20.2462	13.5	13.5	0.05	4.6
1	2014	7.9	19.2738	20.1439	14	5.7	0.07	8.5
1	2015	1.3	19.455	22.3181	14.5	11.5	0.11	11
1	2016	2	19.454	20.87	17	9.8	7.18	20
1	2017	8.1	19.586	13.8	2	10.5	7.29	15
2	2011	8.1	19.6631	12.326	1.7	7.8	97.9	76.18
2	2012	0.8	19.6963	11.2687	3.5	17.5	97.9	76.7
2	2013	-0.6	19.9075	10.531	8.9	13.2	97.9	75.3
2	2014	3.6	19.7507	10.2347	15	9.6	97.9	75.28
2	2015	3.6	20.3185	9.6547	17	8.9	97.9	75.24
2	2016	3.8	20.2662	8.3658	16.5	11.2	97.9	68.17
2	2017	5.1	20.1973	7.3215	18	3.5	97.9	68.06
3	2011	2.6	20.1647	4.2396	12	1.79	85.21	0.6
3	2012	2.6	19.9546	3.3018	15.5	2.07	84.63	0.6
3	2013	2.6	20.1609	3.2687	14.7	2.46	83.54	0.6
3	2014	4.5	19.456	3.268	22	2.71	83.29	0.6
3	2015	3.4	19.5972	3.2684	13.67	2.8	81.19	0.6
3	2016	2.9	19.545	3.2064	18.95	3.38	82.62	0.6
3	2017	2.1	19.5905	2.943	15.3	3.15	81.85	0.6
4	2011	2.9	19.732	3.76	2.9	5.75	88.25	13
4	2012	3.5	19.9814	2.9563	7.5	6.9	89.25	13.3
4	2013	4.3	20.1356	2.7156	7.9	7.3	84.25	14
4	2014	-0.4	18.0828	2.1347	8.3	5	86.34	14
4	2015	0.6	18.6389	1.8222	9.54	9	82.47	16.01
4	2016	0.5	18.8527	1.3254	16.32	16.5	85.27	14
4	2017	0.5	19.0662	1.3264	21.7	14.6	88.54	15
5	2011	-0.3	19.409	2.28	4.3	3.4	70.81	6
5	2012	1	19.9115	3.11	7.3	3.4	70.86	3.85
5	2013	9.8	20.0172	2.5247	5.95	3.5	70.86	8.45
5	2014	8.7	19.0175	3.247	11.56	3.5	71.34	8.66
5	2015	-6.9	19.0201	3.1864	13.67	3.5	71.83	8.53
5	2016	5.4	19.0067	2.9431	17.7	3.6	71.83	8.23
5	2017	3.2	19.0569	2.8763	19.9	3.6	74.2	7.46
6	2011	7.9	19.3122	0.5	4.9	7.2	60.15	25.79
6	2012	7.7	19.5156	1	12.7	6.5	60.15	25.74
6	2013	3	19.7265	2.38	18.6	7.2	60.16	25.64
6	2014	9.9	18.4927	2.2587	18.45	8.5	64.82	25.16
6	2015	0.1	19.1047	3.2934	19.45	9	64.89	24.67
6	2016	2.3	18.9911	3.3012	27.8	6.3	65.23	24.57

6	2017	1.8	18.8747	3.4621	34	10.2	65.87	22.2
7	2011	1.8	18.9032	3.255	12.8	5	85	38.35
7	2012	-1.2	19.1123	2.9	17.6	12	75	38.35
7	2013	6.6	19.3437	4.3966	19.57	8	80	38.34
7	2014	7.9	19.7057	4.2394	17.26	7	78	33.68
7	2015	5.4	19.8624	4.124	12.6	9.6	80	33.61
7	2016	8	19.93	3.142	22.75	8.7	75	33.27
7	2017	9.5	20.1452	3.09	30.5	11.45	73	32.63
8	2011	2.1	20.406	3.9625	13.8	7.9	98	10
8	2012	2	20.7431	3.1235	6.5	8.9	98	13
8	2013	1.75	20.8986	3.0239	9.35	12.45	98	12
8	2014	4.3	19.7759	3.0126	7.8	9.6	98	15
8	2015	2.9	19.8695	3.0048	12.3	14.6	98	18
8	2016	5.8	20.0532	2.9863	9.86	16.5	98	21
8	2017	3.7	20.0609	2.743	11.57	16	98	23
9	2011	0.3	20.0788	3.2687	12	7.5	54.28	0.8
9	2012	1.6	20.1486	3.1527	14.3	8.2	54.39	0.8
9	2013	2.7	20.2564	3.1235	9.8	6.7	54.18	0.8
9	2014	6.3	18.9407	3.0387	12.7	7.5	55.04	0.8
9	2015	6.5	19.2741	3.0196	18.9	8.4	54.92	0.8
9	2016	6.2	19.4083	3.0065	27.6	6.2	54.14	0.8
9	2017	7	19.5073	2.5746	34.5	9.1	54.16	0.8
10	2011	4.7	19.647	9	7.9	4.5	13.21	45.22
10	2012	6.4	19.7097	12	7.6	3.9	13.25	45.01
10	2013	5.7	19.7647	20	12.6	8.6	13.38	45.32
10	2014	8.9	19.0942	17	14.5	6.2	13.38	44.46
10	2015	4.2	19.4671	13	17.4	5.55	13.38	44.58
10	2016	5.6	19.6132	11	8.7	7	13.38	45.36
10	2017	6.2	19.7458	9.62	9.45	11.2	14.28	45.34
11	2011	6.7	19.7867	4	12	10.02	17.21	32.5
11	2012	7.9	19.9687	9	16.6	8.5	17.98	28.4
11	2013	8.7	20.14	6.1258	22.7	9.92	18.3	34.2
11	2014	8.9	18.546	6.38	19.7	13.65	19.25	23
11	2015	9.2	19.1293	7.8363	26.8	13.56	18.39	27
11	2016	3.7	18.6807	4.662	33.65	8.58	17.82	24.5
11	2017	3.8	18.9192	4.357	25.9	13.7	18.75	32.5
12	2011	11.8	19.1227	4	16.7	16	42.34	16.9
12	2012	13	19.2363	6	18.5	17.5	41.28	17.2
12	2013	17.2	19.3544	25.397	23.6	20.5	38.06	8.9
12	2014	18	20.6923	18.2673	34.6	19.8	24.98	7.45
12	2015	15.9	20.8565	13.354	32.9	29.6	22.61	19.9
12	2016	17.6	21.1833	15.9	28.6	22.5	20.98	26.7
12	2017	19	21.2337	10.5	25	24.8	14.06	20.4

Sources: Banks' Published Financial Statements; RBZ Website, RBZ Bank Supervision Reports, Respective Banks Websites

Appendix 2: Descriptive Statistics Results

```
. summarize ROA DC TTs RTGS MB POS IB, separator(7)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	84	5.18631	4.547814	-6.9	19
DC	84	19.61769	.6045382	18.0828	21.2337
TTs	84	6.75214	5.871998	.5	25.397
RTGS	84	15.53833	7.93449	1.7	34.6
MB	84	9.396429	5.389311	1.79	29.6
POS	84	58.02893	32.90109	.05	98
IB	84	22.82333	20.37634	.6	76.7

Appendix 3: Unit Root Test Results

. xtunitroot llc DC

Levin-Lin-Chu unit-root test for DC

Ho: Panels contain unit roots	Number of panels =	12
Ha: Panels are stationary	Number of periods =	7

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 6.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.8167	
Adjusted t*	-3.7742	0.0001

. xtunitroot llc TTs

Levin-Lin-Chu unit-root test for TTs

Ho: Panels contain unit roots	Number of panels =	12
Ha: Panels are stationary	Number of periods =	6

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 6.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-21.7004	
Adjusted t*	-22.8560	0.0000

. xtunitroot llc MB

Levin-Lin-Chu unit-root test for MB

Ho: Panels contain unit roots Number of panels = 12
Ha: Panels are stationary Number of periods = 6

AR parameter: Common Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 6.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-15.0158	
Adjusted t*	-10.4228	0.0000

. xtunitroot llc IB

Levin-Lin-Chu unit-root test for IB

Ho: Panels contain unit roots Number of panels = 12
Ha: Panels are stationary Number of periods = 7

AR parameter: Common Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 6.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.8828	
Adjusted t*	-4.7758	0.0000

```
. xtunitroot llc RTGS
```

```
Levin-Lin-Chu unit-root test for RTGS
```

```
Ho: Panels contain unit roots      Number of panels =    12
Ha: Panels are stationary          Number of periods =     7
```

```
AR parameter: Common              Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included
```

```
ADF regressions: 1 lag
```

```
LR variance:      Bartlett kernel, 6.00 lags average (chosen by LLC)
```

	Statistic	p-value
Unadjusted t	-4.0928	
Adjusted t*	-2.6279	0.0043

Appendix 4: Hausman Test Results

```
. hausman fixed random
```

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
DC	.4088325	1.548973	-1.14014	.4588983
TTs	.0815429	.0385474	.0429956	.0734365
RTGS	-.0201921	.0712517	-.0914438	.0215254
MB	-.135329	.1734237	-.3087527	.0935338
POS	-.1847779	-.0441448	-.1406331	.1189722
IB	-.0123817	.0000658	-.0124475	.1045814

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 10.39
Prob>chi2 = 0.1091
(V_b-V_B is not positive definite)
```

Appendix 5: BPLM Test Results

Breusch and Pagan Lagrangian multiplier test for random effects

$$\text{ROA}[\text{BANK},t] = Xb + u[\text{BANK}] + e[\text{BANK},t]$$

Estimated results:

	Var	sd = sqrt(Var)
ROA	20.68261	4.547814
e	9.00466	3.000777
u	1.547882	1.244139

Test: $\text{Var}(u) = 0$

chibar2(01) = 1.97
Prob > chibar2 = 0.0804

Appendix 6: Ramsey RESET Test Results

```
. ovtest
```

Ramsey RESET test using powers of the fitted values of ROA

Ho: model has no omitted variables

F(3, 82) = 1.95

Prob > F = 0.1286

Appendix 7: Heteroskedasticity Test Results

```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of ROA

chi2(1) = 0.07

Prob > chi2 = 0.7931

Appendix 8: Correlation Matrix

```
. correlate ROA DC TTs RTGS MB POS POS IB
(obs=84)
```

	ROA	DC	TTs	RTGS	MB	POS	POS	IB
ROA	1.0000							
DC	0.2917	1.0000						
TTs	0.3584	0.1323	1.0000					
RTGS	0.3729	0.0014	0.0320	1.0000				
MB	0.5149	0.2730	0.3693	0.3326	1.0000			
POS	-0.4107	0.1120	-0.6255	-0.1990	-0.2621	1.0000		
POS	-0.4107	0.1120	-0.6255	-0.1990	-0.2621	1.0000	1.0000	
IB	0.0276	0.0939	0.2354	-0.0883	0.1334	0.0867	0.0867	

Appendix 9: Regression Results

```
. regress ROA DC TTs RTGS MB POS IB
```

Source	SS	df	MS	Number of obs =	84
Model	744.158505	6	124.026418	F(6, 77) =	9.82
Residual	972.498251	77	12.6298474	Prob > F =	0.0000
Total	1716.65676	83	20.6826115	R-squared =	0.4335
				Adj R-squared =	0.3893
				Root MSE =	3.5538

ROA	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
DC	1.838781	.698046	2.63	0.010	.4487944 3.228769
TTs	.0133643	.0976484	0.14	0.891	-.1810784 .207807
RTGS	.1234382	.0539708	2.29	0.025	.0159686 .2309079
MB	.2430059	.0863437	2.81	0.006	.0710736 .4149382
POS	-.042804	.0169027	-2.53	0.013	-.0764615 -.0091465
IB	.0017924	.0208022	0.09	0.932	-.03963 .0432148
_cons	-32.73502	13.27731	-2.47	0.016	-59.17351 -6.296523