

**EFFECT OF INVESTMENT IN BUSINESS
PROCESSREENGINEERING ON FINANCIAL PERFORMANCE
OF BANKS LISTED AT THE NAIROBI SECURITIES EXCHANGE**

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DECLARATION

I declare this proposal as my original work and has not been published nor submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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ABSTRACT

Despite the heavy investment in Business Process Reengineering; high cost to income ratio, lengthy and manual processes especially for accessing loans, cash deposits, bureaucracy and chaotic downsizing; banks closure have been witnessed in the listed banks at the Nairobi securities Exchange. There is therefore a need to establish whether investment in Business process reengineering has a positive or negative effect on organisation financial performance. There exist little research in this area in Kenya and this study sought to fill on the existing knowledge gap. The main objective of the study was to establish if there exists any relationship between investments in the technical, infrastructure and value layer of Business process reengineering and financial performance. Financial performance which measures cost to income ratio formed the dependent variable. The effect of each investment layer of business process reengineering formed the independent variables measured using expenses on the technical, infrastructure, and value layers of business process reengineering. Descriptive research design was adopted for the study. Census approach was employed for the choice of population hence all the eleven listed banks at the Nairobi Securities Exchange were involved in the study. Panel data was used for this study and was drawn from the audited financial reports of the listed banks over a period of 7 years, from the year 2010 to 2016. Random effects panel regression showed that all variables, except value, were significant at the 5% level. The regression coefficients imply that a unit increase in technology investment would increase the CIR by 13.5% holding all other variables constant; while a unit increase in infrastructure investment would decrease CIR by 79% holding other variables constant. Moreover, the constant 0.516 shows that the level of CIR in the absence of the effect of the independent variables is 51.6%. The p value of the ANOVA test was 0.96%, implying that the overall model was also significant at the 5% level. It was therefore concluded that investment in technology and infrastructure, has a significant effect on the cost to income ratio. However, there is no significant effect of investment in value on the cost to income. Findings from this study can be used for management and policy decisions in the banking sector as well as at the government level. The study having achieved its objectives recommends area of further research on the privately owned banks so as to establish if the trend is similar across the entire banking sector.

Key Words: Cost to Income Ratio, Organisation Performance, Business Process Reengineering, Classical Linear Regression Model.

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DEDICATION

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TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	iv
DEDICATION	v
LIST OF FIGURES	vii
LIST OF TABLES	Viii
ACRONYM AND ABBREVIATIONS	x
OPERATIONAL DEFINITION OF TERMS	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the study	1
1.1.1 <i>Investment in Business Process Reengineering</i>	2
1.1.2 <i>Financial Performance of Listed Banks</i>	4
1.1.3 <i>Listed Banks in Kenya</i>	6
1.2 Statement of the problem	6
1.3 Objective of the study	7
1.4 Research Hypothesis	8
1.5 Significance of the study	8
1.6 Limitation of the study	9
CHAPTER TWO	10
LITERATURE REVIEW	10
2.1 Introduction	10
2.2 Theoretical Framework	10
2.2.1 <i>Resource Dependency Theory</i>	10
2.2.2 <i>Strategic Choice Theory</i>	11
2.2.3 <i>Stewardship Theory</i>	12
2.3 Review of Empirical Literature	13
2.3.1 <i>Effect of investment In the Technical layer on Financial Performance</i>	13
2.3.2 <i>Effect of Infrastructure investments on Financial Performance</i>	15
2.3.3 <i>Effect of Value Dimension Investments on Financial Performance</i>	17
2.4 Knowledge Gap	18
2.5 Conceptual Framework	20
2.6 Operationalization of Variables	20
2.7 Recent Hypothesis	21
CHAPTER THREE	22
RESEARCH METHODOLOGY	22
3.1 Introduction	23
3.2 Research Design	23
3.3 Target Population	24

3.4	Research Variables-----	24
3.5	Data Collection Procedure, Source and instruments of collection-----	25
3.6	Data Processing, Analysis and Rejection Criteria-----	26
3.6.1	Rejection Criteria-----	29
CHAPTER 4-----		
30		
FINDINGS AND DISCUSSION-----		
30		
4.1	Introduction-----	30
4.2	Description Statistics -----	30
4.3	Diagnostic Testing-----	30
	4.3.1 <i>Exploratory Plots</i> -----	32
	4.3.2 <i>Testing for Multicollinearity</i> -----	33
	4.3.3 <i>Testing for Autocorrelation</i> -----	34
	4.3.4 <i>Testing for Heteroskedasticity</i> -----	34
4.4	Specification Testing-----	35
	4.4.1 <i>Random Vs Fixed Effect</i> -----	35
	4.4.2 <i>Random Vs Pooled OLS</i> -----	36
4.5	Normality Tests-----	37
4.5	Model Fitting-----	37
CHAPTER 5-----		39
CONCLUSION AND RECOMMENDATIONS -----		39
5.1	Introduction and Summary of Findings-----	39
	5.1.1 <i>Relationship of Technical Layer and Financial Performance</i> -----	39
	5.1.2 <i>Relationship of Infrastructure and Financial Performance</i> -----	40
	5.1.3 <i>Relationship of Infrastructure and Financial Performance</i> -----	42
5.2	Conclusion-----	43
5.3	Recommendations -----	44
	5.3.1 <i>Investment in the Technical Layer</i> -----	44
	5.3.2 <i>Investment in Infrastructure Layer</i> -----	45
	5.3.3 <i>Investment in Value Layer</i> -----	45
5.4	Limitation of the Study -----	45
5.5	Areas of Further research -----	46
REFERENCES-----		47
APPENDICES-----		56
Appendix I: BPR Dimensions-----		56
Appendix 2: Listed Banks Metrics -----		57

Appendix 3: Banking Sector Metrics-----	
58	
Appendix 4: Listed Banks at the Nairobi Securities Exchange-----	
59	
Appendix 5: Cost to Income Ratio Global View -----	
60	
Appendix 6: Data Collection Tool-----	
61	
Appendix 7: Diagnostic Test Table-----	
64	
Appendix 8: Panel Data-----	65
Appendix 9: Normality Tests PP and QQ Plots -----	67

LIST OF FIGURES

Fig 2.1	Conceptual Framework-----	20
Fig. 4.1	Trend Plots-----	
31		
Fig 4. 3.	Spaghetti (Individual plots-----	
33		

LIST OF TABLES

Table 2.1	Operationalization of Variable-----	21
Table 4.1	Descriptive Statistics-----	31
Table 4.2	Collin Test for Multicollinearity -----	33
Table 4.3	Wooldridge Test for Autocorrelation -----	34
Table 4.4	Likelihood Ratio Test for Heteroscedasticity -----	35
Table 4.5	Hausman Specification Test-----	36
Table 4.6	Breusch and Pagan Lagrangian Multiplier Test-----	36
Table 4.7	Skewness/Kurtosis and Shapiro Wilk Normality Tests-----	37
Table 4.8	Random Effects Panel Regression with Robust Standard Errors-----	38

ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
ATM	Automated Teller Machine
BPR	Business Process Reengineering
BBK	Barclays Bank of Kenya
BSC	Balance Score Card
CFC	CFC Stanbic Holdings Ltd
COOP	The Co-Operative Bank of Keya Ltd.

DTB	Diamond Trust Bank Kenya Ltd
Equity	Equity Group Holdings
HF	HF Group Ltd.
I&M	I & M Holdings
ICT	Information Communication Technology
IS	Information System
KCB	KCB Group Ltd.
NBK	National Bank of Kenya Ltd
NIC	NIC Bank Ltd
SCB	Standard Chartered Bank Ltd

OPERATIONAL DEFINITION OF TERMS

Business process reengineering (BPR)

Is defined by Hammer & Hammpy (1993) as the fundamental rethinking and radical redesign of the business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed.

Dependent Variable

This is the variable that the researcher wishes to explain according to Mugenda (2008).

Performance

Lebans & Euske, 2006 define performance as a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Business Process Reengineering (BPR) is the fundamental rethinking and radical redesign of the business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed. For an initiative to qualify to be a business process reengineering undertaking, a fundamental rethinking of processes, routines, culture, inputs and output approach is required, it needs to be radical in the sense that a new way has to be devised to achieve new outputs and not process improvement tweaking (Hammer & Champy, 1993). In addition the end game is not to achieve small gains but a tenfold, phenomenal and high magnitude results. The aim is also to redefine how organisation wide processes will be carried out to steer it to new competitive heights.

The purpose of Business process reengineering is to make organization's processes the best in class. There are some arguments from several scholars that BPR has its origin in the management theories of the 19th Century. It is however commonly agreed that BPR attracted the eyes of the academic class in 1990 as a result of two papers on reengineering by Hammer (1990) and business process redesign by Davenport (Davenport and Short, 1990). In 1993 they further published two key books (Hammer and Champy 1993), and Davenport (1993) which brought widespread attention to the emerging field of BPR.

Different scholars highlight different number of dimensions of BPR. Masanom (2012) came up with 9 dimensions of BPR which fall under three layers namely; Technical layer, Infrastructure layer and Value layer. The Technical layer consist of process structures that exist in an organisation and are essential to ensure all organisation staff follow standard operating procedures. To deliver the output from these processes technology is a key

component and becomes the driving force that determines how an organisation effectively and efficiently uses her employees to deliver her promises to their customers. Another important aspect of this dimension is an organisation structure that determines how the business is run on the basis of functional, product line base or regional based structures.

Masanom (2012) argue that the infrastructure layer dimension is a crucial pillar in business process reengineering. The reward structure is a key ingredient of this layer that determines how employees will be compensated for delivering services to the company. This may also include benefits for meeting targets and motivating employees. In order to determine the growth trajectory for the organisation development, being able to measure performance and monitoring progress becomes an important aspect of BPR. The other important aspect of this layer is the type of management methods applied to deliver value to shareholders.

Value layer of BPR is another critical dimension according to Masanom (2012). This layer contains the organisation culture which carry the aspect of those silent rules which determine why and how they carry out themselves during their engagement in business of the organisation. This layer also contain the aspect of how political power is shared, brokered and administered in the organisation. It also brings forth who calls the shots and who are crucial allies that the team implementing BPR projects will need to collaborate with for resources allocation. In addition, another important aspect in this layer are the individual belief systems that individuals hold and may either determine success or failure of BPR projects. Business process reengineering therefore is a fantastic endeavor which any organisation should be encouraged to implement especially if all the above dimensions of BPR are incorporated.

1.1.1 Investment in Business Process Reengineering

According to Hammer & Champy (1993) the concept of business process reengineering involve the fundamental rethinking and radical redesign of the business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. This therefore means that the founders of a firm or management should endeavor to improve processes that would lead to rise in cost of production, repetitive activities that hinder timely service delivery and increased bureaucracy. Business process reengineering concept is an offshoot of a process redesign hence after a process redesign, an organization's next move is to identify the selected processes to reengineer. It is evident that investment in BPR is gaining momentum in the banking sector. The first evolution in the Banking Sector in Kenya started in the year 1990s. In the year 2015, Barclays bank highlighted one of her milestones as it celebrated 100 years of her existence in Kenya as being the first bank to digitize her operations leading to the introduction of Automated Teller Machines (ATM) in 1990. The same report highlighted the milestone of being the first bank to setup a local training school, an important aspect of BPR (Barclays Bank, Financial Report, 2015).

The agency model was the second evolution of Banking Business process reengineering, whose aim is to close the gap of the proximity of banking services to customers. In the year 2010 Equity bank, one of the tier one banks became the first bank to rollout an agent banking model which has grown to 24,000 agents (Equity Bank, Financial report, 2015). This was followed by two other leading banks namely KCB and Cooperative Bank. These agency outfits dubbed Equity Agent, KCB mtaani and Coop Kwa Jirani respectively are connected to the banks systems using Mobile Phone and Point –of –sale (POS) technology. This has seen immense banking services penetration and ease of access to such services. A big advantage of this model is that every customer account opened by an agent is on its core banking system eliminating the need to go to the traditional branches

(Venkata & Mishra 2013). According to a CBK Performance and development report, the number of branches increased from 1062 to 1433 compared to agency models that grew from 0 to 40, 224 (CBK report, 2016). This is an indicator that the banks have purposed to reengineer their operations by investing in Technology which is necessary for agents to connect to their Core banking Systems using Point of Sale (POS).

Due to high mobile phone services penetration a third evolution of mobile banking was born from the year 2012. The designed products allow ease of accessing banking services that includes but is not limited to account opening, loans borrowing, savings and all other services availed by conventional banking. The key market leader on this front is Mshwari product launched by Commercial Bank of Africa in the year 2012 (Cook and McKay, 2015). This trend was followed by Equity Bank who launched its digital bank product dubbed Equitel that brings convergence between mobile and banking services. This is run on a heavy investment on Equity Product platform (Equity Bank Financial report, 2015). Another bank that has invested heavily on a similar platform is KCB which launched its KCB-Mpesa product in collaboration with Safaricom, the leading mobile phone service operator in the year 2015. Information from KCB financial report in the 2015 half year results indicate the bank had an accumulated loans borrowed of Kes 11.3 B and over 10 million customers (KCB H1, Financial Report, 2015). These investments have led to a paradigm shift on business processes and continue to make the banking sector one of the most robust sectors in Kenya.

1.1.2 Concept of Firm Financial Performance

Performance is a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results (Lebans and Euske, 2006). This was later emphasized by Kaplan and Norton (1992). Performance is also measured on the areas of

customer service, innovativeness, employees' retention and attractiveness, geographic spread among other aspects. Performance is dynamic, requiring judgment and interpretation. Performance may be illustrated by using a causal model that describes how current actions may affect future results. Performance may be viewed differently depending on the person involved in the assessment of the organizational performance. For example performance can be understood differently by a person within the organization compared to one from outside. To define the concept of performance it is necessary to know the elements characteristic to each area of responsibility. In addition to reporting an organization's performance level it is necessary to quantify results.

Eke and Adaku (2014) state that the recipe for dealing with changing market dynamics and remaining competitive in matters performance is to adopt BPR since it provides a holistic approach, emphasizes the necessity of combining initiatives that seek to provide understanding of the markets, competitors and the organisation within the industry. In addition, the duo reiterate, any corporate organisation seeking to improve on their performance and intends to achieve cost leadership strategy in its market environment, BPR becomes a very vital weapon. IT leadership and Technology play an important aspect of BPR according to Kabiru, Razalli and Norlena (2012); in their research they found that there was a proven relationship between BPR, and IT capability on organisation performance.

In her research on the largest bank in assets and profitability in East Africa-KCB, Achieng (2014) found positive impact on performance of the bank due to adoption of BPR. The bank had gone ahead to establish a BPR department whose objective is to look at all banking processes in order to improve on its performance. The move to establish this unit fit well in the technical dimension of BPR. This therefore means, the view that BPR has positive effect on organisation performance cannot be understated.

Sidikat and Ayanda (2008) emphasize BPR entails the critical analysis and radical redesign of existing processes to achieve breakthrough improvements in organisation performance and this fact cannot be doubted. The financial performance of the listed bank was evaluated using the Return on Assets (ROA) and the efficiency of the same was measured using Cost to Income Ratio (CIR). The Central Bank of Kenya requires Kenyan banks to publish their financial results on the print media. This is further enforced by the capital markets authority in the case of public listed companies

1.1.3 *Listed Banks in Kenya*

There are 11 listed banks at the Nairobi Securities Exchange (NSE) under the main market segment under banking stream (NSE, 2017). The NSE is regulated by Capital Markets Authority (CMA) which was established through an Act of Parliament, Cap 485 in 1989 and whose key role is to ensure proper conduct of all licensed persons and market institutions as well as investors protection (CMA, 2017). The listed banks are required to publish their financial reports widely hence it was easy to access relevant secondary information on financial performance which has a link to the target study in Business Processes investment and their impact on organizations performance. These banks are also clustered into tiers. Tier 1 listed banks include, Equity Bank, KCB Group, Co-op Bank, Standard Chartered and Barclays Bank and Tier 2 banks include National Bank, NIC Bank, CFC Stanbic, DTB Bank, I&M Bank and HF Group (Cyttonn, 2016).

1.2 Statement of the Problem

Banks listed at the Nairobi Securities Exchange (NSE) continue to make heavy investment in business process reengineering, however, productivity which is measured by Cost to Income Ratio (CIR) is not commensurate to these endeavors. Additionally, lengthy

and manual processes especially for accessing loans, cash deposits, bureaucracy, chaotic downsizing, and banks closure have also been witnessed in the recent past. Cytonn (2016) banking report indicates that mean CIR for these banks stood at 52.09% for the period 2010 to 2016 which is very high compared to that of the entire banking sector that fluctuated between averages of a low of 40.9% to a high of 50% and a seven year mean of 44.42%. This means the differential between the listed banks and the entire banking sector stood at 7.67%. From a global perspective the Egyptian banks reported the lowest CIR of 27.70%, Chinese banks had 32.7%. Banks in Qatar, Kuwait, and the United Arab Emirates posted average ratios of 33.12%, 36.86% and 37.04% respectively (Bratton & Garrido, 2016). If a solution to this problem is not found, these firms will continue draining their most needed savings to the wrong investment which will eat into their profitability and impact negatively on their competitiveness.

Local scholars like Murimi (2003) who researched on the effect of BPR in service delivery reported that there was quality of service improvement, and speed. Also a study on the effect of Human resources on BPR Projects at KCB by Mutinda (2009) revealed that management commitment was a major contributor for the BPR Projects success. Also, Mutwa (2014) in his study on perception of BPR on employee's performance at the National bank concluded that there is a direct relationship that boost employees' performance and in return the organizations financial performance. Additionally, Morogo (2014) in her study of BPR as a strategic tool for KCB concluded that the bank had experienced better performance after the reengineering. Conspicuously missing in the above studies is the level of investment made so as to adopt the business process reengineering and the quantitative percentage improvement. There is little or no attention that has been paid on the relationship between the BPR investment and financial performance. This therefore means that there is lack of sufficient and authoritative study to validate the benefits that the banks can gain from BPR

investments. Findings from this study will contribute to the knowledge base on the subject and fill the gap.

1.3 Objectives of the Study

This section outlines the objectives which the study will address. The broad objective of this study is to investigate if there is an effect of investment in BPR projects on organisation financial performance in the publicly listed banks in Kenya. The specific objectives are:

- i. To establish the effect of business process reengineering technical layer investment on financial performance of listed commercial banks at the Nairobi Securities Exchange.
- ii. To establish the effect of business process reengineering infrastructure layer investment on financial performance of listed commercial banks at the Nairobi Securities Exchange.
- iii. To establish the effect of business process reengineering value layer investment on financial performance of listed commercial banks at the Nairobi Securities Exchange.

1.4 Research Hypothesis

The study is guided by the following null hypotheses;

H_{01} : *Investment in business process reengineering technical layer has no effect on the financial performance of listed Commercial banks at the Nairobi Securities Exchange.*

H_{02} : *Investment in business process reengineering Infrastructure layer has no effect on the financial performance of listed commercial banks at the Nairobi Securities Exchange.*

H₀₃: Investment in business process reengineering value layer has no effect on the financial performance of commercial banks listed at the Nairobi Securities Exchange.

1.5 Significance of the study

This study will delve deeper into the effect of full scope of BPR dimensions and their impact on listed banks in Kenya as well as build an authoritative and reliable evidence in the banking sector. If this is not done, the full knowledge on the impact of these dimensions will remain a black box and achievement of the so much desired results by the banks a mirage. The theoretical aspect of this study will enable the understanding of the relationship of investment in BPR on banks' performances from 2010 to 2016 as well as expand the body of knowledge that can be relied on by bank executives and other managers to grow the sector.

This study will practically bring new ideas on which areas to give more focus on since during the appraisal of BPR projects, if not wisely done, may negatively impact the performance of the organisation. From a policy perspective this knowledge can be used to set minimum standards on adoption of necessary measures that aims at reducing the cost of banking to the public and make the dream of the government of financial inclusion to all Kenyans becoming a reality.

1.5 Limitation of the study

The study will be limited to the 11 listed banks at the Nairobi Securities Exchange. Additionally the study will be limited to a seven year period between the years 2010 to 2016 where most of the banks joined the Nairobi Securities Exchange.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review frames an article by positioning it against past research (Reuber, 2011). A thorough, sophisticated literature review is the foundation and inspiration for substantial, useful research. A substantive, thorough, sophisticated literature review is a precondition for doing substantive, thorough, sophisticated research. “Good” research is good because it advances our collective understanding. To advance our collective understanding, a researcher or scholar needs to understand what has been done before, the strengths and weaknesses of existing studies, and what they might mean. A researcher cannot perform significant research without first understanding the literature in the field. Not understanding the prior research clearly puts a researcher at a disadvantage (Boote & Beile 2005).

2.2 Theoretical Framework

Miles and Huberman (1984) describe a conceptual framework as the current version of the researcher’s map of the territory being investigated. It is also defined as a structure for

organizing and supporting ideas; a mechanism for systematically arranging abstractions; sometimes revolutionary or original, and usually rigid. Conceptual framework can be viewed as providing a theoretical overview of intended research and order within this process.

2.2.1 Resource Dependency Theory

The basic proposition of resource dependence theory is the need for environmental linkages between the firm and outside resources. In this perspective, directors serve to connect the firm with external factors by co-opting the resources needed to survive (Pfeffer and Salancik, 1978). Investment in technical dimensions require management to collaborate with outside organisations in order to acquire the technology that determine the processes that are going to be adopted by the organisation and to maximize the shareholders wealth. The resources could also include the required skill set that are outside of the organisation. Harrington (1991) describe three metaphors of organizations namely machinery, organism and processes. Acquisition of these resource may be influenced by the organisation structure. There exists different organisation structures namely; functional, matrix and divisional structures (Motana & Charnov,1993).

Yusoff and Alhaji (2012) indicate having the right management that is able to identify the much required transactional cost is crucial. This theory is crucial for this study since it shows the linkage between what the organisation needs to look at as it plans to invest in technology and processes that add value to the organization, considering the transaction theory is important when determining the required resources in an organisation. The main concern of transaction cost theory is to facilitate transactions using the governance structures that have been tailored. The implication is that decision makers must weigh up the production and transaction costs associated with executing a transaction within their firms (insourcing) versus the production and transaction costs associated with executing the transaction in the

market (outsourcing). If they choose to use the market, they must then determine the appropriate type of contract to use (Awotundun, Kehinde, and Somoye, 2011). This consideration is important since as the organisation invests in different technologies the need to evaluate the Net Present Value (NPV) of their investment as well as the cost benefit analysis is important so as to maximize shareholders wealth.

2.2.2 Strategic Choice Theory

Founded under organizational theory, the strategic choice approach became widely used as the underlying theoretical foundation in investigating corporate governance research issues from the 1980s to the mid-1990s. This approach stresses that actions are undertaken by directors to help the firm adapt to its environment. The ability of the firm in adapting to its environment is argued as the main explanation of the organizational outcomes obtained by the firm. Therefore, the role of the Directors progresses from the mere performance of legal tasks to those involving strategy development (Kreiken, 1985). The other important function is for directors to apply appropriate tools and management methods so as to measure performance of the organisation and report positive results to the shareholders. In fulfilling this role the board can use tools such as the Kaplan and Norton Balance Score Card. The choice of investing in a sizeable and quality board is therefore very important in order to deliver better performance.

2.2.3 Stewardship Theory

Stewardship theory emerged from psychology and sociology field of study. The theory argues against managerial opportunity and emphasizes on trust and achievement on the part of managers as both managers and owners have similar objectives. The Board is expected to take an active part in the strategy formulation process, senior management and

board members work as a team not merely to ensure compliance but also to enhance organizational performance through collaborative efforts (Donaldson and Davis, 1991).

Agyris (1973) suggested that agency theory considers individuals as economic beings but suppresses its own aspirations while stewardship theory recognizes the importance of structures that empower the stewards and officers to maximum autonomy built on trust. In light of the value layer, this theory provides an important connection in that it bestows the honors on all employees to work as stewards in order to maximize the shareholders wealth as they benefit. Training and development investment is an important building block of this dimension and the theory calls for each employee to shun their own beliefs which includes working for the common good of the organisation leading to better performance as good stewards.

2.3 Review of Empirical Literature

This section includes the review of several studies carried out by other scholars and in particular on the effect of investment in various business process reengineering pillars such as the technical , infrastructure and value layer investment.

2.3.1 Effect of investment in the Technical Layer on Financial Performance of Banks

Several processes exist within the banking sector so as to offer the financial services that include deposit taking and lending. To fulfil this duty the banks have been pushed by competition and customers' demands to install very robust systems that are driven by various technologies. The board members are also endowed with the responsibility of formulating organisation structures to ensure there is smooth running of their businesses in order to maximize the shareholders wealth as they apply the agency principle (Awotundun et.al, 2011)

The process structure consist of guidelines on how to carry out various functions, policies, procedures and practices. Some of the processes that are evident in most of the banks is customer screening, Know Your Customers (KYC), Customer Relationship Management (CRM), loan requests and approval processes, and cash withdrawals and deposits. To accomplish this, installing systems such as credit scoring tools, core banking systems, and Human Resource Information Systems (HRIS) is key as well as having solid financial reporting systems. In the recent past banks have also started moving away from the mortar and brick branch networks to more versatile and easy to access digital platforms as well as agency outlets.

Use of technology could include aspects like use of internet connectivity medium to spearhead new processes such as internet banking that enable customers to receive banking services beyond working hours, reach more customers across geographies and reduce congestion in the banking halls. In addition these systems help in customer retention as banks invest on loyalty programs and targeted messaging services to make financial propositions using the mobile phone. Information technology was found to contribute positively to the organisation performance by Achieng (2014).

Training and having solid staff who run the process and manage the technology highlighted above has led banks to make conscious decisions of hiring top notch executives and very knowledgeable operations team. It is quite evident that investment in this ingredient of business process reengineering has contributed to the banking sector quest for financial inclusion. In her BPR study in KCB, Achieng (2014) found that the investment in the physical layer of BPR did not only improve the organisation performance but was also a key driver in cost reduction strategy leading to efficiency. In another study Satyanarayana and Kavitha (2011) found out BPR hadan impact on customers as well as on banks performance.

Organisation structure defines who performs, manages, and is accountable for each business process. Having a good structure determines how efficient an organisation becomes. Different structures exist for example functional, divisional or mixed organisation structure. Adopting the organizational structure to make it fit the new defined processes is a crucial task that determines how the organisation will reap benefits of the reengineering efforts. Shin and Jemella (2002) in their study on Business Process Improvement for J.P Morgan and Chase found that there was a relationship of investing in BPR projects that resulted to new products that led to performance improvement of the bank. In another study it was clear from obtained results that banks in Pakistan were implementing the business process re-engineering in their different operations and results were significant. Innovation, information technology use and change of management increased the performance, attitude and effectiveness of the banks. Efficiency and performance increased due to implementation of the business process re-engineering (Nadeem& Ahmad 2016). Additionally, in another study carried out in Ethiopian banks it was discovered that the main achievements of BPR were; service delivery since time reduced dramatically as a result of the new process redesign and introduction of information and communication technology services (introduction of e-banking); introducing a single customer contact point through employee empowerment to make all the necessary decisions at that point of contact which resulted in improving the satisfaction of employees and customers(Kuhil,2013). A study done in the South African market also indicated that there was positive effect on organisation performance (Sarang, 2005). Since there is no study that has shown the actual impact of investment in the researcher hereby propose below hypothesis

H₀₁ : Investment in business process reengineering technical layer has no effect on the financial performance of listed Commercial banks at the Nairobi Securities Exchange.

2.3.2 Effect of Infrastructure Investment on Financial Performance of Banks

The infrastructure dimension refers to interpretation of policies and procedures which heavily influence how the technical dimensions operate on a day-to-day basis. These include reward structure, measurement systems and management methods. Having a good reward system contributes to the morale of employees and fastens adoption of business process reengineering initiatives (Kimuru, 2010). Another study by Achieng (2014) agrees on this view. To succeed in implementation of Key BPR projects, building of working reward strategy that motivates employees is essential. This should begin from resources identification, onboarding and key promises when deliverables are achieved. To ensure rewards given are commensurate with achievement, proper measurement and reporting methods are essential. Use of Kaplan and Norton Balance Score Card (BSC) would be ideal in measuring these achievements. This score card consists of financials, customer, internal business Process, learning and growth (Kaplan, 2010). Measuring what needs to be achieved is crucial in any organisation. Having feedback mechanisms is a crucial pillar in an endeavor of measuring performance. To determine the reengineering efforts' success, or failure, performance of new processes must be measured and compared to the processes being replaced.

In their study on determinants of Organizational performance, the case of Romania; Gavrea, Ilies, and Stegrean (2011) found that there was a positive relationship in use of performance measurements on organisation performance and for those companies hoping to improve their market success, this pillar is very important. Having proper roles defined and mechanisms to ensure adherence to procedures so as to achieve desired results is an aspect that needs to be considered when starting the journey of re-engineering. The roll out mechanism and procedures on how to achieve desired results is also important. Three levels

of management exist in any form of an organisation namely top, middle/tactical and lower management/operations. Success of any re-engineering endeavors will succeed based on the management support especially the top management. A study by Sarang (2005), Hammer and Champy (1993) agree to this assertion. Weiner and Mahoney (1981) in their study on 193 manufacturing companies on leadership found that managerial practices have a significant impact on two organizational performance components namely share performance and profitability. It is therefore paramount to have the right structures that encourage positive management methods since the success of reengineering lies squarely on the leadership. Customer centric management is also important since the key essence of reengineering is to improve customers offering to improve on financial performance. Below hypothesis is proposed to ascertain if there is any impact on investment on the technical layer.

H₀₂: Investment in business process reengineering technical layer has no effect on the financial performance of listed commercial banks at the Nairobi Securities Exchange.

2.3.3 Effect of Value Dimension Investment on Financial Performance of Banks

The value dimension defines the organization's culture and drives behavior. Leadership and improvement philosophies must emerge from these dimensions. Aligning the value dimensions to support the re-engineered organization requires organization executives to demonstrate leadership. Any Organisation comprises of individuals who have different belief systems and culture. However to meet business requirements a common culture is required so as to meet the organization's objectives. This could be a culture of excellence or determination to always to be at the top. The culture of an organization is normally formed of unspoken collective rules and need no enforcement to be adhered to. As the banks grow, the

culture of having one view by all employees is being improved by connectedness and this is helping in building organizations' culture. Ease of communicating and training that build positive culture is being enhanced by BPR investments to a great extent. Organizations have gone further to provide feedback systems that enhance working relationships. Culture may be well defined in as part of the institutions mission though it may be relatively obscure. Another aspect closely related to organisation culture is organisation political power which means the ability to accomplish tasks by use of human resources.

Aligning the organisation culture in order to accomplish reengineering tasks is paramount endeavor. Different departments depending on their contribution to the organisation have different levels of influence and also determine proximity or power distance between the organizations' decision makers. This means to make reengineering projects successful it is important to allow powerful managers to steer them with an aim of getting buy-in and funding from top management. We can find three contributors to the power of organizational sub-units namely workflow pervasiveness. The number of tasks in the organization which are dependent on the units output, and immediacy. The speed at which the loss of the unit would affect the performance of other sub-units, and substitutability which is the ability of another unit to perform the activity or to find alternative suppliers (Hickson, 1974). Oben-Addae (2015) states in her study on evaluating the effect of Business process reengineering in Ghana that the investment contributes to the morale of employees since it allows more time for a work life balance. Individual belief systems are the attitudes and mental models that individuals apply to themselves, those they work with, and the work itself. Examples of mental models: Impatience, skepticisms, openness, control, rigidity, and flexibility in aligning the value dimensions to support the re-engineered organization requires organization executives to demonstrate leadership. Additionally due to commonality of intent and purpose, individual belief systems which are positive are easily transferred within the

organisation through use of common connections. It is therefore important to determine and apply strategies to decrease the negative impact of cultural conflicts on the organizational performance. This means an organization's employees need to shun individual beliefs for the benefit of meeting organizational objectives. Below hypothesis is proposed so as to determine the value investment impact on BPR.

H₀₃: Investment in business process reengineering value layer has no effect on the financial performance of commercial banks listed at the Nairobi Securities Exchange.

2.4 Knowledge Gap

Though there exists literature on the BPR by some researchers such as (Kabiru et.al2012; Achieng, 2014; Morogo, 2015; Nadeem& Ahmad, 2016; Osano&Okwano, 2015; Makokha, Ujunju, Wepukhulu, 2013) only a few concentrated on the dis-benefits of the same. However there exists evidence that efficient processes can lead to collapse of banks as was the case of the bank run of Chase Bank whose efficient systems enhanced siphoning of customer deposits using alternative channels such as internet banking (Onyango, 2016). Some of the common technology dis-benefits include machine failures, increase in service charge to customers so as to cater for the capital expenditure and running cost, security/cyber-attacks, lack of computers, and loss of personal contact with the bank as the top five issues.

The subject on the downside is not emphasized and only a few scholars have looked into this such as Satyanarayana and Kavitha (2011) who insist on need to look at BPR as a whole and not to over concentrate on the benefits alone. Hammer & Champy (1993) highlight some failure factors on BPR to emanate from a process perspective. He points out having a fixed process which is not flexible enough to be responsive to the needs and requirements, not

involving employees for example bottom up in decision making, assigning someone who does not understand BPR, technology limitations, designing a project with focus on cost reduction and downsizing, having a weak team, and problems with communication. In addition Shin & Jemella (2002) argue that information technology is the main pillar that has changed the way we do business in the last decade whereas other scholars indicate it as one of the driving force of BPR.

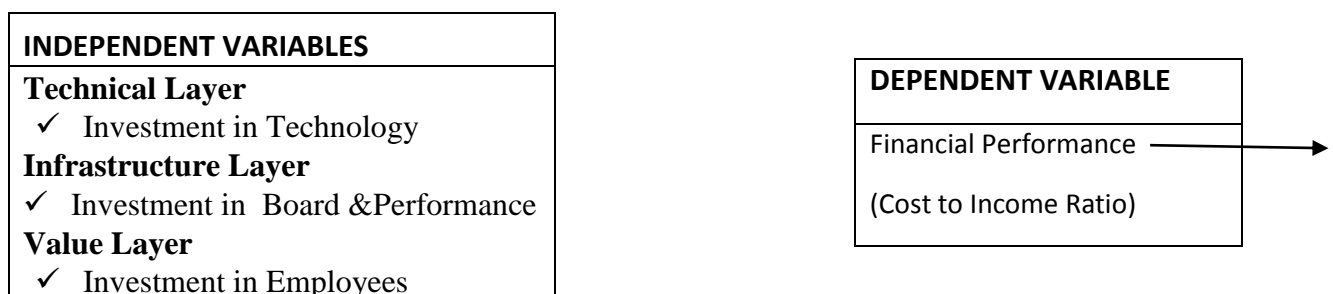
In Kenyan context there is no industry wide knowledge on this subject like the one available from studies done by Kabiru et.al (2012) in Nigeria on effect of Framework of Business Process Re-engineering Factors, Nadeem and Ahmad (2016) on impact of Business Process Re-engineering on the Performance of Banks in Pakistan and Kuhil (2013) in his study of Business process reengineering and organisation performance, a case for Ethiopian public banking sector. Additionally, despite the existence of the aforementioned studies in Pakistan, Ethiopia and Nigeria the exploration on the connection between investment in BPR and its empirical evidence on performance is conspicuously missing. In addition the scholars that have studied this subject concentrated on one pillar whereas scholars believe there are about three or more dimensions of business process reengineering. Some of the studies that have focused on one aspect of BPR include that of Mutinda (2009)

2.5 Conceptual Framework

The key variables in this study are categorized as independent variables and dependent variables. Independent variables are called predicator variables because they predict the amount of variation that occurs in another variable while dependent variables, also called criterion variables, and is that which is influenced or changed by another variable (Mugenda 2008). The depended variable is the variable that the researcher wishes to explain. The moderating variable is a variable that alters the strength of the causal relationship (Frazier et al., 2004). In the case of this study a moderating variable has not been used. This

study adopted the conceptual framework laid out in fig 2.1 below. The dependent variable is financial performance which is measured by Cost to Income Ratio (CIR). The independent variable is Technical layer investment- which consist of process structure, technology structure, and organization structure which will be measured using the expenditure on technology over the total banks' expenses. The infrastructure layer investment –consists of reward structure, measurement systems and management methods. This will be measured by annual expenditure by the board that is responsible for strategic direction of the banks as a percentage of the total expenses. The third variable is the value layer investment consisting of organisation culture, political power, and individual belief systems. This will be measured by the expenditure on training, development and restructuring as a percentage of the total expenses.

FIGURE 2.1
Conceptual framework



2.6 Operationalization of Variables

A variable is a condition or quality that can differ from once case to another.

TABLE 2.1
Operationalization of Variables

Variable	Type of Variable	Indicators	Measure	Scale of Measurement	Tools of Analysis
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Financial Performance	Dependent	Improved productivity	Cost to Income Ratio	End of financial year intervals	Descriptive and use of regression
Technical Layer BPR investment	Independent	Reported audited expenditure	The amount spent on Technology as a percentage of total expenses	End of financial year intervals	Descriptive and use of regression tools
Infrastructure layer BPR investment	Independent	Reported audited expenditure	The amount spent on Board of Directors responsible for strategic direction as a percentage of total Expenses	End of financial year intervals	Descriptive and use of regression tools
Value Layer BPR investment	Independent	Reported audited expenditure	Employees cost, restructuring, training and development as a percentage of total expenses	End of financial year intervals	Descriptive and use of regression tools

2.7 Recent Hypothesis

From recent studies on the subject of business process reengineering several hypothesis have come forward. Kuhl (2013) in his study of Business process reengineering and Organisation performance, a case for Ethiopian Public Banking Sector came up with two hypothesis. One, BPR does not reduce operating cost in the banking operation but reduces operating cost in a bank. Second, BPR does not improve the service delivery to customers but improves the speed of service delivery in banking operations. Findings from this study indicate that there are observable and tangible positive improvements in the banks' process efficiency. Operational cost was reduced; service quality improved; cycle time was reduced by BPR and consequently customers' satisfaction improved significantly. In another study, Ozcelik (2010) in his study, Do Business process reengineering projects payoff? Case for United States of America came up with three hypothesis. First, firms experience a drop in performance during BPR project implementation. Second, firm performance improves after

the completion of BPR projects. Third, the effect of BPR projects on firm performance increases with project scope. The researcher found out that while overall performance of firms remains unaffected during the implementation of BPR projects, it increases significantly after the implementation period. He also found that functionally focused BPR projects on average are associated more positively with firm performance than those with a cross-functional scope. This may indicate that potential failure risk of BPR projects may increase beyond a certain level of scope. Additionally, Sidikat and Ayanda (2008) in their study on Impact Assessment of Business Process Reengineering on Organizational Performance, Case for Nigeria banks hypothesized that there is no significant relationship between Business Reengineering Process and organizational performance. The study concluded that Business Process reengineering has become a useful weapon for any corporate Organization that is seeking for improvement in their current organizational performance and intends to achieve cost leadership strategy in its operating industry and environment.

CHAPTER THREE

RESEARCH METHODOLOY

3.1 Introduction

This chapter presents the methodology that was used in this study. Section 3.2 covers research design, Section 3.3 Target population, Section 3.4 Research Variables, Section

3.5 Data Collection procedure, instruments and source of data, and Section 3.6 Data Processing and analysis.

3.2 Research Design

A descriptive research design has been adopted for this study since it is intended to proffer description of phenomena. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection (Glass & Hopkins, 1984). Descriptive design may be used for the purpose of developing theory, identifying problems with current practice, justifying current practice, making judgments, or determining what others in similar situations are doing (Waltz & Bausell 1981). The study included description of relationships between various variables. According to Simon (2011) in a correlation research design, the purpose of the researcher is to investigate one or more characteristics of a specified group in order to discover the extent to which the characteristics correlate. This method is found to be more appropriate since it provided a systematic way of collecting data, analyzing information and reporting of results. Past financial reports, performance artifacts allows exploration and understanding of complex issues according to Zaidah (2007). Advantage of using this method is that the examination of the data was to be conducted within the context of its use (Yin, 1984) hence not prone to interference from the units of study.

The study is indeed a descriptive correlation due to the fact that historical panel data was to be used and the researcher has no influence over the same. Secondly, the researcher sought to discover the relations between variables. For example the effect of investment of technology, infrastructure, and value dimension on financial Performance. Thirdly a repeated measurement of a sample was observed at the same time at the start of the study, over a period of time, termed as a longitudinal study. The “task” in longitudinal studies was to find

meaningful associations between performance changes and changes in specific outcome behaviors or abilities of interest. Polit (1998) defined longitudinal designs as “repeated tests that span an appreciable length of time

3.3 Target Population

A population is the totality of all subjects that conform to a set of specifications, comprising the entire group of persons that is of interest to the research and to whom the research results can be generalized (Polit and Hungler 1999). Mugenda (2003) define population as a set of elements with widespread attributes that can be generalized. The study targeted the eleven listed banks. Kenya has only 11 listed banks at the Nairobi Securities Exchange. These include Equity Bank, KCB Group, Co-op Bank, Standard Chartered, Barclays Bank, National Bank, NIC Bank, CFC Stanbic, DTB Bank, I&M Bank and HF Group (Cytonn, 2016). The unit of analysis is the organizations hence the organizations full year performance results which was used in the study to deduce the effect of BPR investments. Census was used for the study.

3.4 Research Variables

Four variables have been considered for this study. The dependent variable is financial performance(Y). This variable is defined as a set of financial indicators which offer information on the degree of achievement of objectives and results (Lebans & Euske, 2006). The researcher concentrated on the financial achievement using CIR. The first independent variable was BPR technology layer(X_1). This variable was measured by a bank’s investment on technology (systems, intangible assets). This refers to the total annual expenditure on computers, innovation, mobile technology, and software expressed as a percentage of total expenses of the bank. The second independent variable was BPR infrastructure layer(X_2).

This variable was measured by a bank's percentage investment on infrastructure on items such as investment in measurements systems and board spend. This was operationalized by annual expenditure on the board in a year as a percentage of the annual expenses. The third independent variable is value layer investment(X_3). This was captured by the percentage annual expenditure of a commercial bank on restructuring, training and development over the annual expenses.

3.5 Data Collection Procedure, Source and instruments of collection

Different Data collection methodologies exist and each researcher should choose the one which is most cost effective. In this regard panel data was collected over a period of Seven years starting from the year 2010 to 2016. This method was used by Nyaga (2013) in his study on the effect of Restructuring of Small and Medium Enterprises in ICT Sector in Kenya. In addition, Nyachae (2014) used the same design to investigate the Effect of Firm Performance on Corporate Governance practices of Firms Listed at the Nairobi Stock Exchange. In this study panel secondary data was specifically mined from the sample banks audited financial reports of the past 6 year's performance. The year from 2010 to 2015 has been selected since most of the banks were listed within this period hence this guaranteed a high response rate. For validity and reliability, audited financial results as required by the Central Bank of Kenya, Nairobi Stock Exchange and the Capital Markets Authority was used. The table shown in the Appendix 6 was used as an instrument for collecting the data. Data included total expenses, cost to income ratios, return on assets, and expense on intangible assets such as software, expenses on the management fee, training and development cost.

3.6 Data Processing, Analysis and Rejection Criteria

Data processing was done as per advice given by Kothari (2004) i.e. coding, editing and tabulation. Coding was done using excel and statistical software STATA tool was used for all the diagnostic and regression tests. Tabulation was the final stage used to prepare feeding the data, graphs, and pie charts were used to present and display findings. They allowed presentation of data in a clear and meaningful way which was easy to interpret (Kothari 2004). This method was used by Nyaga (2013) in his study on the effect of restructuring in SMEs in the ICT sector.

Data firstto underwent diagnostic tests to determine the presence of autocorrelation, heteroskedasticity and multicollinearity. A key decision on the approach on whether to use fixed effects or random effects model. Oscar (2007) states, when interested in analyzing the impact of the variables that vary over time data Hausman test can be used to differentiate between fixed effects model and random effects model. Fixed effects regression methods are used to analyze longitudinal data with repeated measures on both independent and dependent variables. There are two basic data requirements for using fixed effects methods. First, the dependent variable was measured for each individual on at least two occasions, in our case the financial performance was measured more than once at a regular interval (end of financial year from the year 2010 to the year 2015). Those measurements were directly comparable, that is, they had to have the same meaning and metric. In this regard a unit of observation such as CIR using a ratio/percentage was used across the board. Second, the predictor variables of interest must change in value across those two occasions for some substantial portion of the sample. The financial performance change was found considerable over a period of one year hence it was possible to observe actual changes on this span.

Autocorrelation is a characteristic of data in which the correlation between the values of the same variables is based on related objects. It violates the assumption of instance independence, which underlies most of the conventional models. It generally exists in those

types of data-sets in which the data, instead of being randomly selected, is from the same source. Autocorrelation refers to the correlation of a time series data with its own past and future values. It is also called lagged correlation or serial correlation, which refers to the correlation between members of a series of numbers arranged in time. Serial correlation was tested using Wooldridge test.

Heteroskedasticity is a condition where the variance of the error terms differ across observations. Likelihood ratio test is best used for assessing if heteroskedasticity is present (Oscar 2007). Multicollinearity (also known as collinearity) is a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. Collin test was used and mean Variance Inflation Factor (VIF) observed. To help in determination of choice of model Hausman Specification was used to choose between fixed effect model and Random effect. Breusch Pagan test was used to determine the choice between Random effects and OLS Regression. The model was used to establish the linear model that explains the relationship between technology layer, infrastructure, and value layer as the independent variables and financial performance measured by CIR as the dependent variable. Diagnostic test table samples shown on Appendix 7. The regression model equation take format shown below:

i. $Y_i = \alpha + \beta X_{1i} + \beta X_{2i} + \beta X_{3i} + \varepsilon$ [Eq.1-Simple Ordinary Least Square Equation]

Y-Represent the Dependent Variable represented by Cost to Income Ratio

X1-Represents Technical layer investment

X2-Represent Infrastructure layer investment

X3 –Represents value layer investment

I-represent banks

α –constant

β -coefficient

ε -error

ii. **$Y_{it} = \alpha + \beta X_{1it} + \beta X_{2it} + \beta X_{3it} + \varepsilon + \varepsilon_{it}$ [Eq.2 Random Effect Equation]**

Where,

Y_{it} - is the dependent variable (DV)

U_{it} - between entity error

ε_{it} - error term within entity error

ε -unobserved error term

βX_{it} -represents independent variables (IV), where i = entity and t = time.

α -represents the constant coefficient.

ii. **$Y_{it} = \alpha + \beta X_{1it} + \beta X_{2it} + u_i + u_{it}$ [Eq.3-Random Effect Equation]**

Where

α -constant

– α_i ($i=1 \dots n$) is the unknown intercept for each entity (n entity-specific intercepts).

– Y_{it} is the dependent variable (DV) where i = entity and t = time.

– X_{it} represents one independent variable (IV),

– β_1 is the coefficient for that IV,

– u_i -fixed effect specific to entity

– u_{it} is the error term

3.6.1 Rejection Criteria

A significant value of 0.05 % is preferred by researchers (Oscar (2007). A value greater than this figure would mean that the researcher would fail to reject the null hypothesis (Laerd, 2013). If the value of tolerance is less than 0.2 or 0.1 and, simultaneously, the value of VIF 10 and above, then the multicollinearity is problematic hence would lead to rejection of null of no multicollinearity. Autocorrelation was tested using Wooldridge test, if a $p < 5\%$ was attained the researcher would then fail to reject the null hypothesis of first-order autocorrelation. When testing Heteroscedasticity using Likelihood ratio test the researcher would reject null hypothesis if the value of this statistic is too small. In actual sense the null is homoskedasticity (or constant variance). Above this value we reject the null and conclude heteroskedasticity. The Hausman test is sometimes described as a test for model misspecification. In panel data analysis (the analysis of data over time), the Hausman specification test was used to choose between fixed effects model and a random effects model. The null hypothesis is that the preferred model is random effect, the alternate hypothesis is that the model is fixed effects. The researcher would reject the null hypothesis if the p-value is small (less than 0.05).

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter discusses the actual analysis that was carried out in this research. A 100% success rate was achieved from the population of the 11 listed banks totaling to 77 observations per variable over the 7 year period confirming the data was balanced for a micro panel. Analysis started with a presentation of the data's descriptive statistics. Next trend plots which showed the trend of the response variable with respect to each bank were articulated. Diagnostic tests were then carried out on the data to evaluate its conformance with the Gaussian, standard, or classical linear regression model (CLRM) that makes ten assumptions. This includes the regression is linear in the parameters, X values are fixed in a repeated sampling, Zero mean value of disturbance, Homoskedasticity or equal spread, no Autocorrelation between the disturbances, the disturbance u and explanatory variable X are uncorrelated, the number of observations n must be greater than the number of observations to be estimated, variability in X varies, the regression model is correctly specified and there is no specification bias or errors and there is no perfect multicollinearity. This procedure yielded evidence of heteroskedasticity, no multicollinearity and first serial correlation. The Hausman test, which indicated that the random effects model was the model appropriate for this analysis than the fixed effects model. Finally, results of fitting the random effects model with robust standard errors (to remedy the problem of heteroscedasticity) were discussed.

4.2 Descriptive Statistics

The summary statistics for the 11 sampled listed banks over the 2010 to 2016 period are shown in table 4.1 below. The statistical measures that were computed for the study's variables are mean, standard deviation, minimum, and maximum. Taking a look at the statistics for the dependent variable, analysis indicated that the cost to income ratio was quite stable over time and across panels. The mean was 0.5216; maximum was 0.78 while the

minimum was 0.35. Moreover, the overall standard deviation was 0.10202. The mean investment in technology was 0.057, with a maximum of 0.48 and a minimum of 0. The standard deviation was 0.7502 for this variable. Investment in infrastructure had a mean of 0.057. The least observation for this variable was 0 (implying no investment in infrastructure) while the maximum was 0.12. Finally, value had a mean of 0.467, a minimum of 0.06 and a maximum of 0.63.

TABLE 4.1
Descriptive Statistics

. xtsum CIR TECH INFRA VALUE						
Variable		Mean	Std. Dev.	Min	Max	Observations
CIR	overall	.5216883	.1020243	.35	.78	N = 77
	between		.1015167	.3728571	.7457143	n = 11
	within		.0302806	.435974	.6045455	T = 7
TECH	overall	.057013	.0750274	0	.48	N = 77
	between		.0273186	.02	.1014286	n = 11
	within		.0702974	-.0444156	.4355844	T = 7
INFRA	overall	.0202597	.0199324	0	.12	N = 77
	between		.0156859	.0071429	.05	n = 11
	within		.0130643	-.0168831	.1031169	T = 7
VALUE	overall	.4672727	.1074297	.06	.63	N = 77
	between		.0795612	.2528571	.5542857	n = 11
	within		.0755705	.0787013	.6487013	T = 7

4.3 Diagnostic Testing

A regression diagnostic may take the form of a graphical result, informal quantitative results or a formal statistical hypothesis test, each of which provides guidance for further stages of

a regression analysis. Some of the exploratory diagnostics tests include the trend pots and spaghetti style plots (individual plots).

4.3.1 Exploratory Plots

The trend plots showed that the CIR of each of the 11 listed banks had some degree of variability over the sampling period, See fig 4.1. The individual plots showed different y intercept for the variables confirming the differences in the firms. This conformed to CLRM assumptions. This is indicated in figure 4.1 below.

FIGURE4.1

Trend Plots

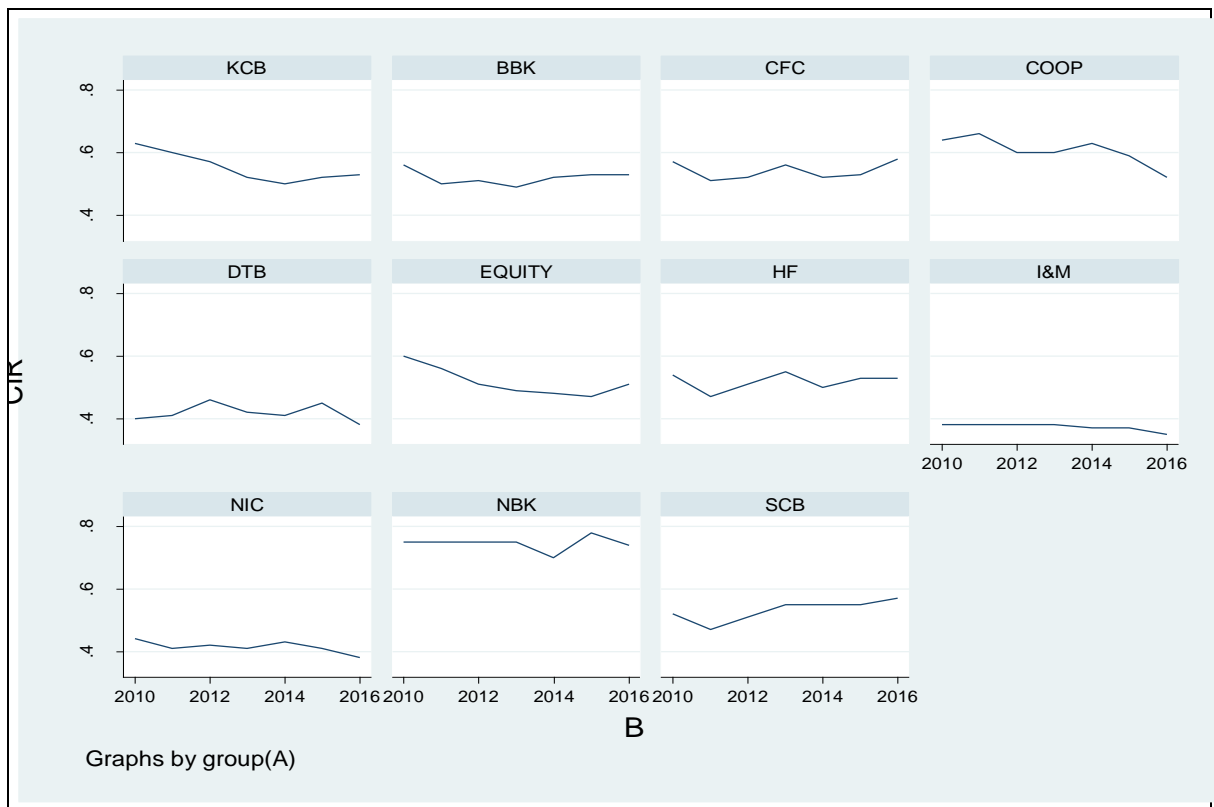
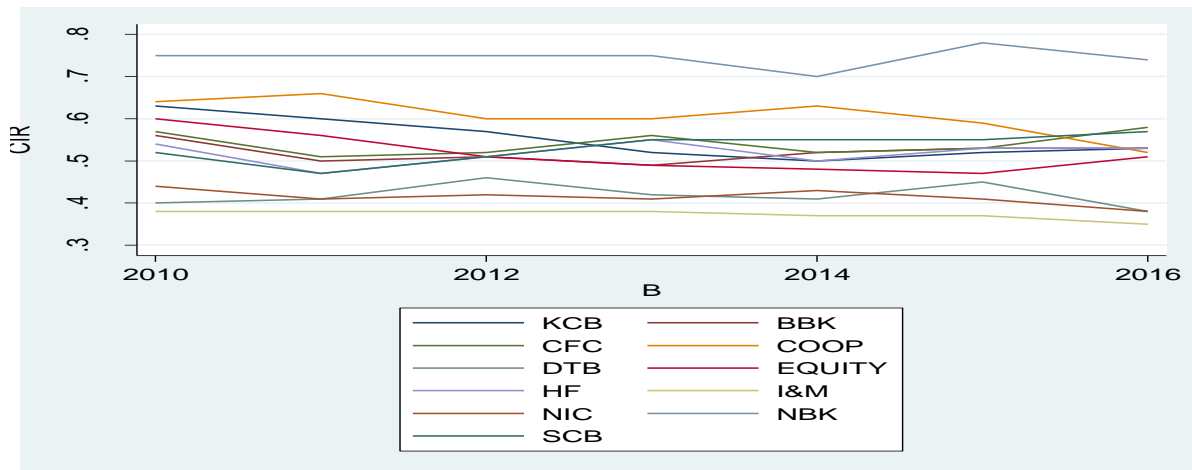


FIGURE 4. 3

Spaghetti (Individual plots)



4.3.2 Testing for Multicollinearity

Multicollinearity is the phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. In this study Multicollinearity was tested using the Collin test. This test given the mean Variation Inflation Value (VIF). P-value above 5 leads to confirmation of multicollinearity. From the test mean p value of 1.33 was obtained confirming absence of multicollinearity. See results in table4.2 indicated that there was no multicollinearity within the independent variables.

TABLE 4.2

Collin Test for Multicollinearity

. collin TECH INFRA VALUE (obs=77)				
Collinearity Diagnostics				
Variable	VIF	SQRT VIF	Tolerance	R- Squared
TECH	1.41	1.19	0.7077	0.2923
INFRA	1.48	1.22	0.6736	0.3264
VALUE	1.10	1.05	0.9113	0.0887
Mean VIF	1.33			
Cond				

4.3.3 Testing for Autocorrelation

Autocorrelation is a characteristic of data in which the correlation between the values of the same variables is based on related objects. This study used Wooldridge test. The null hypothesis for Wooldridge is that there is no serial correlation. A significant p-value of less than 0.005 lead to rejection of this null hypothesis (Oscar 2007).From the test shown in table 4.3 below a p value of 0.0609 indicate we should not reject the null hypothesis and confirm there is no first order autocorrelation between variables.

TABLE 4.3

Wooldridge Test for Autocorrelation

<code>. xtserial CIR TECH INFRA VALUE</code>			
Wooldridge test for autocorrelation in panel data			
H0: no first-order autocorrelation			
	F(1,	10) =	4.457
	Prob > F =		0.0609

4.3.4 Testing for Heteroskedasticity

Heteroskedasticity is a condition where the variance of the error terms differ across observations. The Likelihood Ratio test is preferred for testing this (Oscar, 2007). The null hypothesis for this test is homoskedasticity (or constant variance) exist between the variables. A significant value below p-value of 0.005 lead to rejection of the hypothesis. Results from the Likelihood-ratio test for heteroscedasticity was 0.0074 as shown in table 4.4 which is significant and lead to rejection of the null hypothesis. This confirm heteroskedasticity is present and violates the CLRM assumptions. The treatment for this is using robust to treat the heteroskedasticity.

TABLE 4.4

Likelihood Ratio Test for Heteroskedasticity

Coefficients: generalized least squares						
Panels: heteroskedastic						
Correlation: no autocorrelation						
Estimated covariances	=	11	Number of obs	=	77	
Estimated autocorrelations	=	0	Number of groups	=	11	
Estimated coefficients	=	4	Time periods	=	7	
Log likelihood	=	109.5385	Wald chi2(3)	=	12.00	
			Prob > chi2	=	0.0074	
CIR	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
TECH	.1493475	.0577255	2.59	0.010	.0362077	.2624873
INFRA	-.8084571	.2345532	-3.45	0.001	-1.268173	-.3487413
VALUE	.0357444	.0531417	0.67	0.501	-.0684114	.1399003
_cons	.5218091	.0244695	21.32	0.000	.4738499	.5697684

4.4 Specification Testing

In regression analysis specification is the process of developing a regression model. This process consists of selecting an appropriate functional form for the model and choosing which variables to include.

4.4.1 Random Vs Fixed Effect Test

To decide between fixed or random effect you can run a Hausman test where the null hypothesis is that the preferred model is random effects vs. the alternative the fixed effects it basically tests whether the unique errors (ui) are correlated with the regressors, the null hypothesis is they are not (Oscar, 2007). A significant p-value of less than 0.05 lead to rejection of the null hypothesis. The results of the Hausman test gave a p-value of 0.98949 as shown in table 4.5 implying that the random effects model should be fitted since the p value obtained was not significant.

TABLE 4.5

Hausman Specification Test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
TECH	.1301883	.1352277	-.0050393	.0143224
INFRA	-.7638913	-.7958827	.0319914	.0862317
VALUE	.0276932	.0293462	-.001653	.0108057

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(3) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
= 0.15
Prob>chi2 = 0.9849

4.4.2 Random Vs Pooled OLS

Random effect Breush and Pagan Lagtangan Multiplier (BPLM) tests is prescribed determine which method to use (Oscar, 2007).The LM test helps you decide between a random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities is zero. This is, no significant difference across units (i.e. no panel effect). A value below the significance value leads to rejection of the null hypothesis. From the BPLM test shown on table 4.6 a P value of 0.00 was observed that lead to rejection of the null hypothesis and concluded random effect model was preferred for this study.

TABLE 4.6
Breusch and Pagan Lagtangan Multiplier Test

```
. xttest0
Breusch and Pagan Lagrangian multiplier test for random effects

CIR[Banknum_01,t] = Xb + u[Banknum_01] + e[Banknum_01,t]

Estimated results:

```

	Var	sd = sqrt(Var)
CIR	.010409	.1020243
e	.0010321	.0321258
u	.0124689	.1116644

```
Test: Var(u) = 0
      chibar2(01) = 178.31
      Prob > chibar2 = 0.0000
```

4.5 Normality Tets

In Stata, you can test normality by either graphical or numerical methods. The former include drawing a stem-and-leaf plot, scatterplot, box-plot, histogram, probability-probability (P-P) plot, and quantile-quantile (Q-Q) plot. The latter involve computing the Shapiro-Wilk, Shapiro-Francia, and Skewness/Kurtosis tests, the test rejects the hypothesis of normality when the p-value is less than or equal to 0.05. Failing the normality test allows you to state with 95% confidence the data does not fit the normal distribution. From the tests conducted both Skewness and Kurtosis as well as Shapiro yielded values below the significant value of 0.05 confirming the distribution is not normal. However from the PP and QQ Plots shown on Appendix 9 showed the distribution to be normal hence proceeded to carry out the model fitting.

TABLE 4.7

Skewness/Kurtosis and Shapiro Wilk Normality Tests

. sktest TECH INFRA VALUE						
Skewness/Kurtosis tests for Normality						
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj	joint	Prob>chi2
				chi2(2)		
TECH	77	0.0000	0.0000	54.32	0.0000	0.0000
INFRA	77	0.0000	0.0000	37.04	0.0000	0.0000
VALUE	77	0.0000	0.0038	20.53	0.0000	0.0000
. swilk TECH INFRA VALUE						
Shapiro-Wilk W test for normal data						
Variable	Obs	W	V	z	Prob>z	
TECH	77	0.65926	22.667	6.824	0.00000	
INFRA	77	0.80880	12.719	5.560	0.00000	
VALUE	77	0.89513	6.976	4.247	0.00001	

4.6 Model Fitting

The random effects model was fitted after selecting the option of robust standard errors (to cater for the problem of heteroscedasticity). The results of model fitting are shown in table 4.7 below.

TABLE 4.8

Random Effects Panel Regression with Robust Standard Errors

R-sq: within = 0.0670		Obs per group: min = 7				
between = 0.1057		avg = 7.0				
overall = 0.0849		max = 7				
corr(u_i, X) = 0 (assumed)		Wald chi2(3) = 11.43	Prob > chi2 = 0.0096			
(Std. Err. adjusted for 11 clusters in Banknum_01)						
CIR	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
TECH	.1352277	.0583583	2.32	0.020	.0208475	.2496078
INFRA	-.7958827	.2465241	-3.23	0.001	-1.279061	-.3127044
VALUE	.0293462	.0482165	0.61	0.543	-.0651564	.1238488
_cons	.5163903	.0386305	13.37	0.000	.4406759	.5921046
sigma_u	.11166443					
sigma_e	.03212576					
rho	.92355649	(fraction of variance due to u_i)				

Random effects panel regression showed that all variables, except value, were significant at the 5% level. The regression coefficients imply that a unit increase in technology investment would increase the CIR by 13.5% while a unit increase in infrastructure investment would decrease CIR by 79%. An assumption of holding other variables constant was made. Moreover, the constant 0.516 shows that the level of CIR in the absence of the effect of the independent variables is 51.6%. The p value of the ANOVA test was 0.96%, implying that the overall model was also significant at the 5% level. It was therefore concluded that investment in technology and infrastructure, has a significant effect on the cost to income ratio. However, there is no significant effect of investment in value on the cost to income ratio. The regression model can be written as:

$$\text{CIR} = 0.516 + 0.135\text{TECH} - 0.796\text{INFRA} + 0.029\text{VALUE} \text{ -Equation [4]}$$

CIR = Cost to income ratio

TECH = Technology investment

INFRA = Infrastructure investment

VALUE = Value investment

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction and Summary of Findings

Banks' efficiency has been a big concern for many boards of management in the recent past. Despite the heavy investment made by the banks, the CIR has remained high which forms the basis of the statement of problem of this study. All the listed banks formed the population of the study and data gathered over a span of 7 financial years from the year 2010 to 2016 collected and analyzed. A hundred percent success was achieved in data collection. During this period Kes. 438 Billion (52%) expenditure went to investment in BPR. See Appendix 6.

The summary of the study is presented in this chapter as guided by the specific objectives. These are followed by conclusions and recommendations. The chapter finally gives direction on areas of further research. The general objective of this study was to investigate the effect of Business process reengineering on performance of listed banks at the Nairobi Securities Exchange. The study relied on theoretical and empirical studies on Business process reengineering, and financial performance. The hypothesized relationships were then tested empirically. Prior to the empirical test, certain assumptions about the variables used in the analysis were tested since most statistical tests rely upon them. Results from these tests indicated no violation of the Classical Linear Regression Model (CLRM) assumptions.

5.1.1 To establish whether Technical Layer Investment dimension of BPR has a relationship with Financial Performance of Banks.

The study found that the technical layer investment has a positive effect on financial performance of listed banks. The results obtained and shown on table 4.7 reported a positive coefficient of 0.135 on this variable meaning a unit increase in technology investment would increase the CIR by 13.5 % holding all other variables constant. The significant p-value of

0.02 was obtained using 95% confidence level led to rejection of the null hypothesis H_{01} indicted below.

H_{01} : Investment in business process reengineering technical layer has no effect on the financial performance of listed Commercial banks at the Nairobi Securities Exchange.

These findings applied in reference to the resource dependence theory indicate that environmental linkages between the firm and outside resources will drive efficiency of these firms to a new height as the organisation continue to spend on technology, processes and best fit organisation structure. The findings are congruence with other studies carried out by Jemella (2002) on Business process improvement for J.P Morgan and Chase that concluded there was a relationship of investing in technology layer of BPR which resulted to new products that led to performance improvement of the bank. Additionally, information technology was found to contribute positively to the organisation performance by Achieng (2014) in her study in KCB.

5.1.2 To Establish Whether Infrastructure Layer Investment Dimension of BPR has a relationship with Financial Performance of Banks

The study results revealed there is a positive effect on financial performance as a result of investment on the technical layer of BPR that consist of reward structure, measurement systems and management methods as confirmed by a p-value of 0.001 shown on table 4.7. From the regression analysis a coefficient value of -0.79 was obtained meaning a unit increase in infrastructure investment would decrease CIR by 79% holding other variables constant. The negative sign on the coefficient indicate a negative impact on CIR by a unit increase in infrastructure investment. The significant p-value of 0.001 led to rejection of null hypothesis H_{02} below.

H_o2: Investment in business process reengineering Infrastructure layer has no effect on the financial performance of listed commercial banks at the Nairobi Securities Exchange

This finding is aligned with the strategic choice theory on the need to have appropriate tools and management methods that are cost effective so as to measure performance of the organisation and report positive results to the shareholders. This may also mean reduction on the Directors fees expenses and increase on pillars with greater performance influence since increase of spend on the same will lead to a negative impact on CIR. The study results agree with Weiner and Mahoney (1981) conclusion on their study on 193 manufacturing companies on leadership that found that managerial practices have a significant impact on two organizational performance components namely share performance and profitability.

Additionally, Gavrea, Ilies, and Stegrea (2011) in their study on determinants of Organizational performance, the case of Romania found that there was a positive relationship in use of performance measurements on organisation performance. However the negative coefficient is a matter of concern and the result is in congruence with Chambers N. Harvey G, Mannion R, Bond J & Marshall (2013) in their study on Towards a framework for enhancing the performance of NHS boards concluded there is some evidence to suggest that the benefits accrued by larger boards, particularly in relation to increased monitoring, are outweighed by higher agency costs, informational asymmetry and communication and decision-making problems. Improved monitoring can also come at a cost of weaker strategic advising and greater managerial myopia. Firms with boards that monitor intensely exhibit worse acquisition performance and reduced corporate innovation. This being the case more investment in large board would lead to negative impact beyond a certain threshold which

may be difficult to determine, it is however worth noting the significant p-value indicate within reason levels the investment has an effect on organisation efficiency.

5.1.3 To establish whether Investment in Value Layer Dimension of BPR has a Relationship with Financial Performance of Banks

The study revealed investment in value layer that consist of organisation culture, political power, individual belief systems does not yield much statistical significance on financial performance of banks listed at the NSE. This is confirmed by p-value of 0.54 as shown on table 4.7 that was obtained. A coefficient of .0029% was also obtained which mean a unit increase in value layer would impact the CIR by 2.9% which is not sufficient to improve the firms' efficiency. Due to the high p-value greater than 0.005 the researcher accepted the null hypothesis H_{o3} :

H_{o3}: Investment in business process reengineering value layer has no effect on the financial performance of commercial banks listed at the Nairobi Securities Exchange.

This result agrees with findings from Australasian banks study on cost to income ratio by Tripe (1998). He argues the danger with emphasis on cost to income ratios is that bank managements are inclined to assume that the response to any downturn in bank profitability is to reduce costs. This will often involve essentially knee-jerk short-term reactions, rather than reflection on the bank's business or re-engineering to achieve sustainable long-term cost reduction. A classic example of this approach has been action by banks to make older, more-experienced managers redundant, which loses a body of corporate knowledge from banks. This means that in due course the banks have to re-learn lessons from the past which the redundant managers would have known. Another example is the tendency to cut training

budgets in the face of so-called cost crises, which may reflect reductions in income, nothing to do with banks' cost structures at all. The study results and above conclusion by Tripe explain the marginal results that emanate in these short term efforts which actually increase cost in the short term. These findings explain why the CIR may be declining in Kenya's listed banks despite the heavy spend in this layer especially on downsizing among other short term efforts instead of devising innovative ways of reengineering that will grow their revenue.

5.2 Conclusion

The ANOVA test at 0.96% implied that the overall model was significant at the 5% level and this revealed that investment in BPR layers has significant effect on Kenya listed banks in Kenya where technology and infrastructure investments are greater contributors. However, there is no statistically significant effect on investment in value layer on the cost to income ratio. The study therefore encourages spending more on the technical layer that touches on technology which will not only have a positive effect on CIR but also bring huge impact in improving the efficiency of these organisations as the organisation management closely monitors performance. These results are in congruence with previous studies done by Morogo (2015) who concluded BPR had been used as a strategic tool in KCB to drive efficiency. Additionally, Nadeem & Ahmad (2016) concluded that efficiency and performance increased due to implementation of the business process re-engineering and Murimi (2003) who researched on Effect of Business process reengineering on Service Delivery, case for Cooperative Bank and concluded the quality of service delivery improved due to this investment. The objective of involving a wide population to confirm the BPR effect has been achieved by carrying out a census on all the listed banks at the NSE. Additionally, the objective of providing an authoritative study that can be relied on by not only

the listed banks but the entire banking sector and the global market has also been achieved in this study. The study adds to the knowledge base as was envisaged, this can be relied on by management at both policy and strategic level. In actual sense these findings can be used by the political class to influence the government to reduce cost of technology equipment and software to drive efficiency in the banking sector especially under the current state of rising inflation, tough micro and macroeconomic environment which has impacted the banking sector negatively following the banking amendment act 2016 which served two main purposes of introducing a cap on the maximum interest rate chargeable on a credit facility; and introduced a minimum rate of interest on deposits held in interest earning accounts according to Wainaina (2016).

Additionally, this study findings can be used for helping in project prioritization especially when operating under constrained budgets. The Human Resources and technology divisions can also use this study to build and retain a knowledge base that would be crucial in driving organisation performance and tailor making development courses in alignment to BPR objective. If these recommendations are not adopted organisations will continue to invest in the wrong dimensions and deplete the needed resources which will continue to impact the banks competitiveness.

5.3 Recommendations

From these findings there is need for the banking sector to adopt the right dimension of business process reengineering since the study confirms that there exists a relationship between the three pillars of BPR and financial performance.

5.3.1 Investment in the Technical Layer

Technology is as good as those who use it. Therefore management teams need to have a good knowledge of technology advancement as well as considering the people using it since technology alone cannot deliver benefits to an organisation. In addition, if not properly implemented technology can lead to dis-benefits. It is therefore recommended that any bank intending to invest in this pillar need to perform due diligence, bench mark with other organisations, consult widely and carry out proper projects appraisal before selection of BPR initiatives and use of skilled project managers who follow the right project management methodology. This view is aligned to Ziagris (2001) who elaborately discusses the methodology of a BPR project implementation / alternative techniques in his study.

5.3.2 Investment in Infrastructure Layer

The study findings indicated that though this is an important dimension of BPR, a lot of investment should not be put on the same since it can impact CIR negatively. As a matter of fact it leads to a negative impact on the CIR on every unit increase. It is therefore recommended that banks should endeavor to strengthen her workfare and reduce agency cost by tying the board of Director's remuneration to organisation performance. This view is in agreement with Ong & Lee (2000) who discusses the agency theory problems in detail.

5.3.3 Investment in Value Layer

The study revealed that this pillar does not have significant contribution on business process reengineering. It is therefore recommended that the organisation should consider increase spend on technology which both yield positive impact and significant contribution on CIR and carefully examine downsizing that may take away key knowledge management that will reduce the firms productivity.

5.4 Limitation of the Study

This study adopted the use of secondary data that created the panel. Though this method provides ease of data collection and saved a lot time and biases from primary data collection. A big miss was on the lack of the personal touch associated with the latter. In addition though the data was mined from audited reports, if there were any errors or omissions it was not possible to verify or consult the authors of reports.

5.5 Areas of Further Research

A step in the right direction of providing relevant findings has been made. However the banks involved in the study are heavily regulated not only by the Central Bank of Kenya (CBK) but follow stringent compliance rules laid down by the Capital Markets Authority (CMA) and the Nairobi Securities Exchange (NSE). This therefore means under this tight measure the organizations are not left with much of a choice but to have proper governance structures, capital requirements and ratio so as to safeguard public interest. It would be therefore interesting to carry out a research on the wider Kenya market banking sector which includes privately owned banks that have had immense malpractices reported as well as collapses and investigate the role BPR plays in their operations or the impact of the lack thereof.

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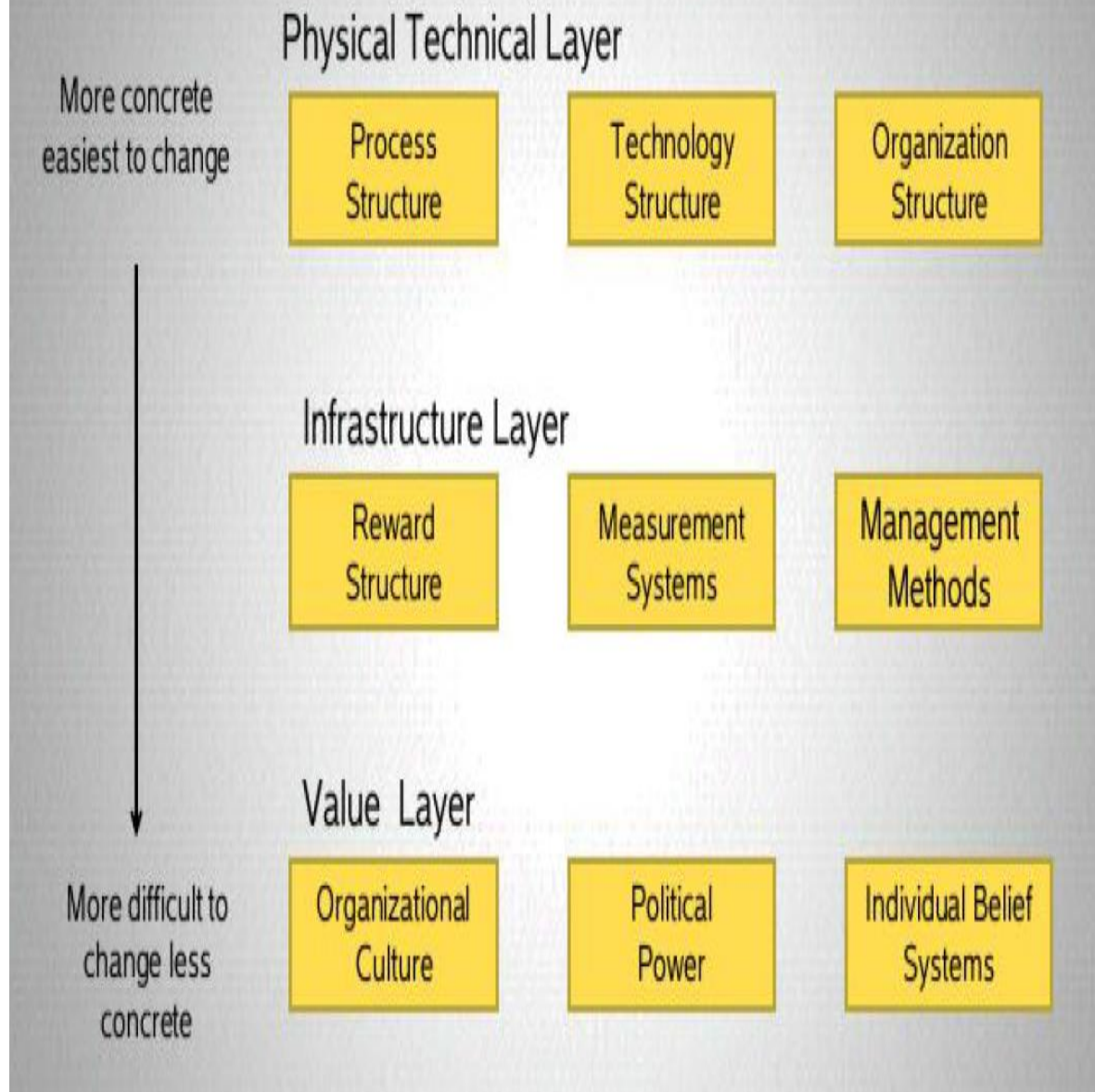
Zairi, M. & Ahmad H. 2007. Business Process reengineering critical success factors in higher education. *Business process Management Journal*, Vol. 13 iss 3 pp. 451-469).

Ziagris, S. 2001. Business Process Reengineering BPR. Innoregio.*Report produced for the EC funded project.*

APENDICES

APPENDIX 1: BPR Dimensions

Dimensions of Business Reengineering



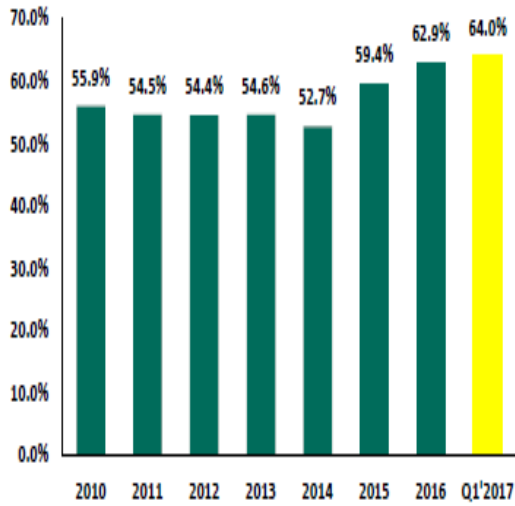
Source. Masanom (2012)

APPENDIX 2: Listed Bank Metrics

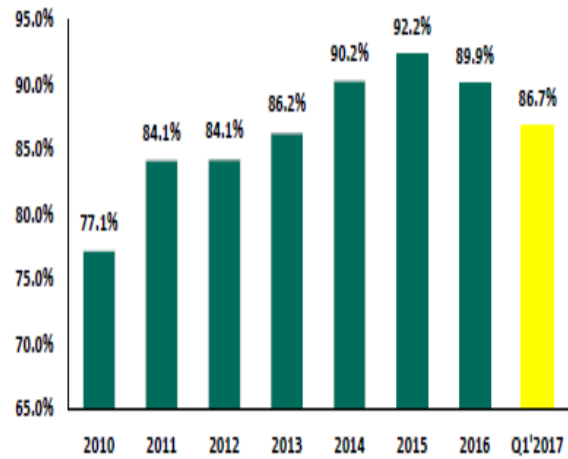
Listed Banking Sector Metrics, continued...

High levels of NPLs and rising costs remain a point of concern for the sector

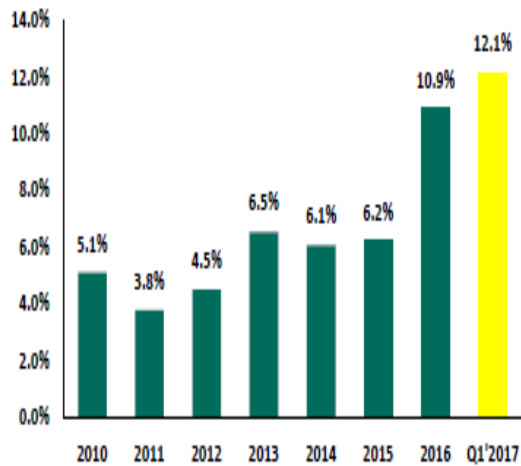
Cost to Income (%)



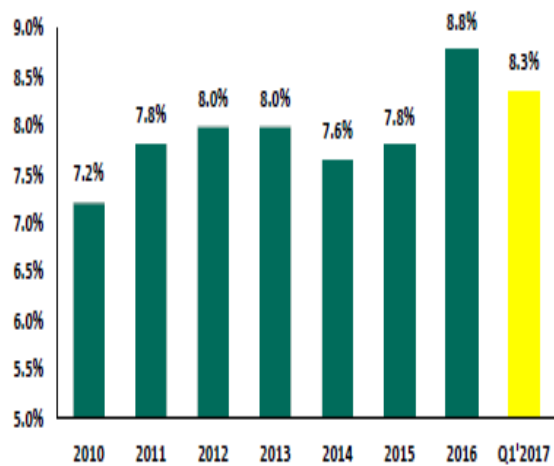
Loan to Deposits (%)



NPLs to Total Loans (%)



Net Interest Margin (%)



Source: Central Bank of Kenya

28



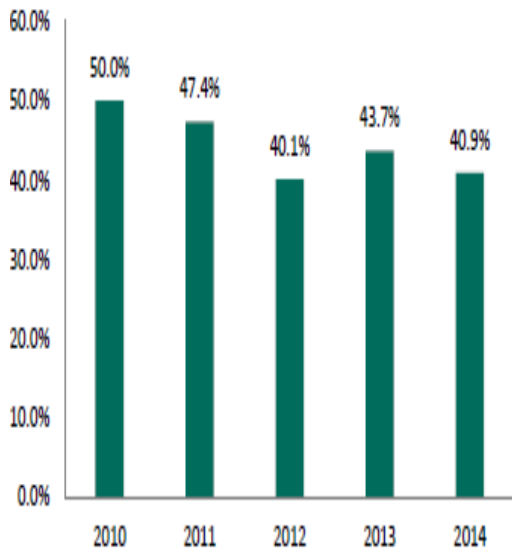
Source. Central Bank of Kenya, 2017

Appendix 3: Banking Sector Metrics

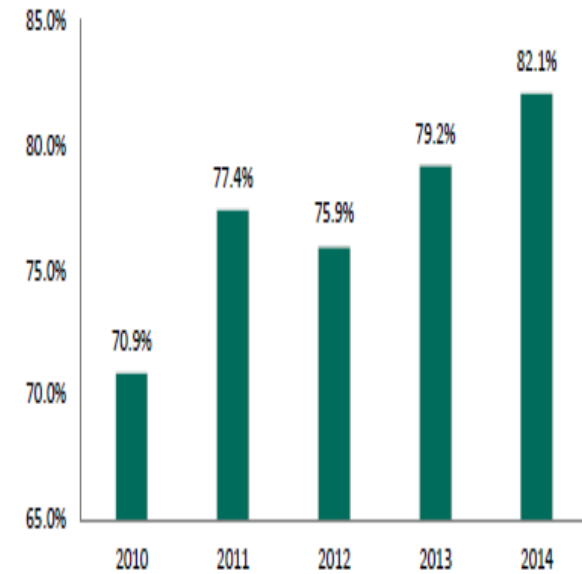
Banking Sector Metrics, continued...

Improvement in efficiency still a bright spot for the sector, despite tighter profit margins and uptick in non performing loans

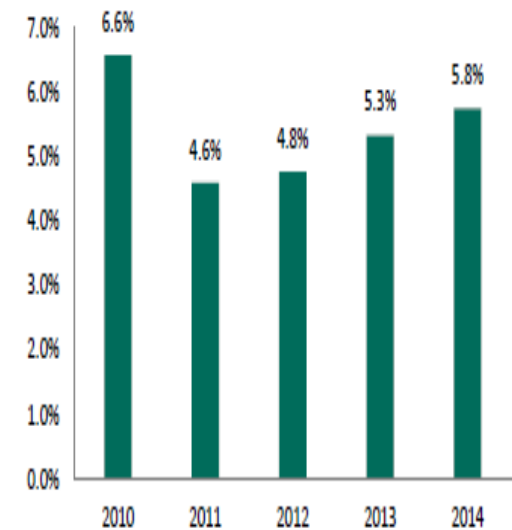
Cost to income (%)



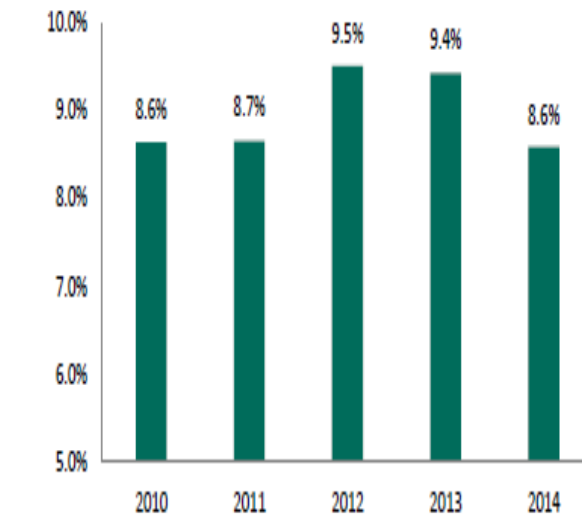
Loans to deposits (%)



NPLs to total loans ratio(%)



Net interest margin (%)



Source. Central Bank of Kenya 2017

Appendix 4: Listed Banks at the Nairobi Securities

Tier 1 Banks Value Drivers and Cons

Bank	Value Drivers	Cons
Equity Group	<ul style="list-style-type: none"> Equity Bank is currently the largest insurance intermediary and Equity Investment Bank is the 2nd largest Stockbroker in the country with a market share of 16% Equitel is the fastest growing MVNO 	<ul style="list-style-type: none"> Cost control: Equity bank has a big challenge to maintain their cost as they are investing highly in IT Expansion Setbacks: Equity bank has encountered some setback in their regional expansion where they have not been as profitable as in others
KCB Group	<ul style="list-style-type: none"> KCB Mpesa, is expected to be a key growth driver in terms of deposits and loans Alternative channels including mobile banking and agency banking 	<ul style="list-style-type: none"> Exposure to different political, economic and regulatory environments especially the impact of South Sudan operation The bank seems to be struggling in utilising its asset base compared to its peers in generation of returns
Co-op Bank	<ul style="list-style-type: none"> It has a large Sacco banking base, and the opportunity to grow upon the model in its regional expansion strategy Co-operative bank is a financial one-stop shop owing to its full range of financial services 	<ul style="list-style-type: none"> The bank is slow in embracing technology compared to its peers in deposit mobilisation The bank might be losing out in first mover advantage in their expansion strategy
Standard Chartered	<ul style="list-style-type: none"> Custody business will continue providing the bank with a niche when it comes to wholesale banking Strong in SME banking business 	<ul style="list-style-type: none"> Recently high NPLs have affected the revenues for Standard Chartered Bank. Limited to the Kenya as the parent company prefers to operate independently in other markets
Barclays Bank	<ul style="list-style-type: none"> Barclays has historically enjoyed cheaper funding from its parent company and has not had borrowings historically, this however might have to change going forward if Barclays Plc exits Africa The bank has one of highest net interest margin of 10.7% as at H1'2016 	<ul style="list-style-type: none"> Stiff competition in the retail and SME banking market The bank will continue lagging its peers in the capture of the retail market Challenges in deposit mobilization compared to its peers
DTB Bank	<ul style="list-style-type: none"> Strong backing from financing partners, i.e. Aga Khan Fund for Economic Development and Habib bank 	<ul style="list-style-type: none"> Traditional SME market now being targeted by tier I banks hence market share under threat Exposure to different political, economic and regulatory environments

47



Tier 2 Banks

Tier 2 banks value drivers and cons

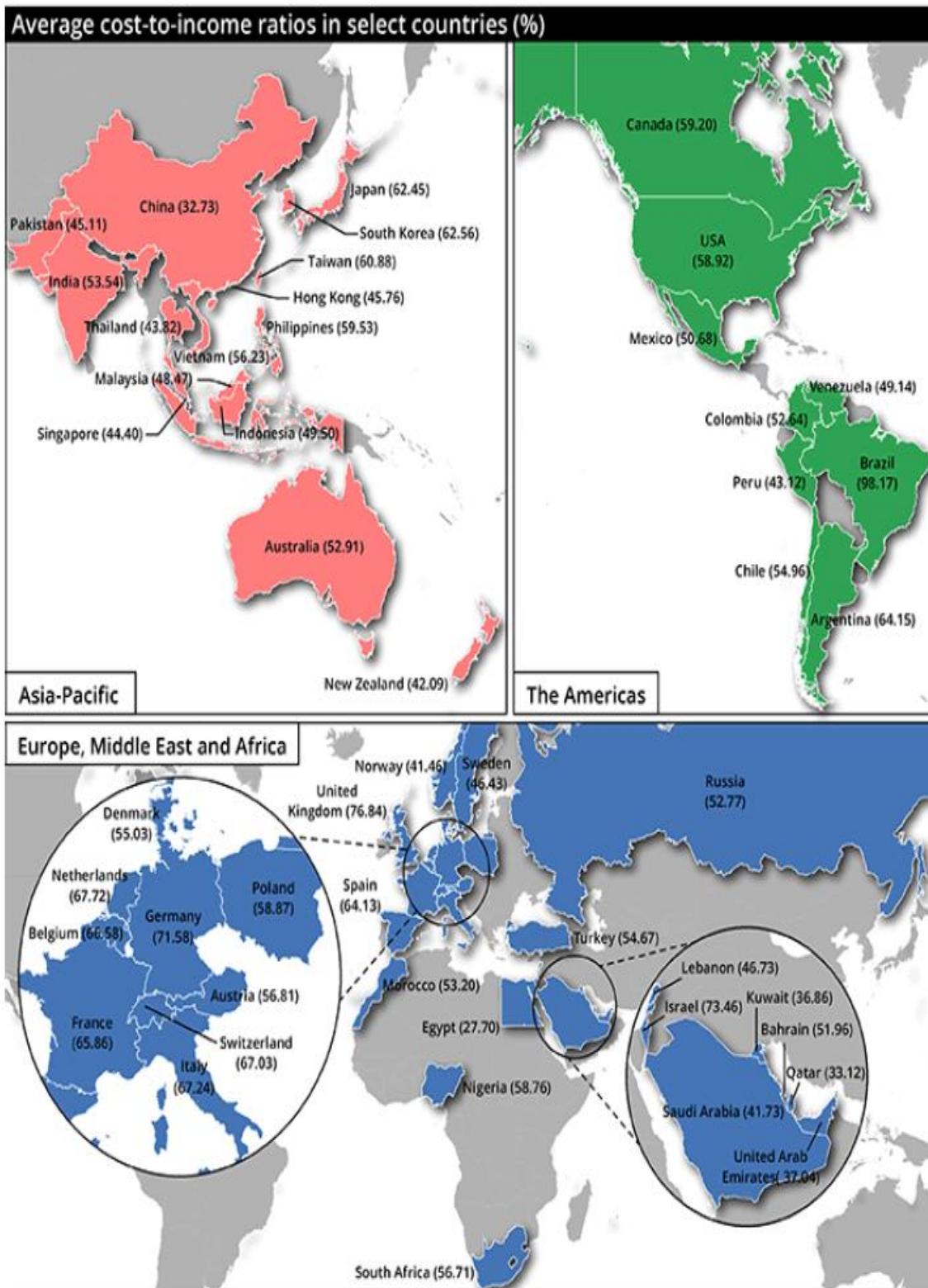
Bank	Value Drivers	Cons
National Bank	<ul style="list-style-type: none"> Introduction of Islamic Banking that capitalized on the unbanked Islam community contributing to deposit growth The introduction of bancassurance and custodial services has seen the bank diversify its revenue 	<ul style="list-style-type: none"> High cost of funds. Despite NBK serving retail customers, it has maintained high cost of funds averaging 5.3% thus leading to lower NIMs of 7.0% Despite being associated with the Government, the bank is slow in county expansion
NIC Bank	<ul style="list-style-type: none"> Increased investment in digital platforms, NIC Now and Internet banking by 29% and 41%, respectively NIC bank has maintained its pole positioning in asset financing and carved a niche in the market 	<ul style="list-style-type: none"> Traditional SME market now being targeted by Tier 1 banks, hence it's market share is under threat Exposure to different political, economic and regulatory environments, especially in Kenya with the upcoming elections might slow down business
CfC Stanbic	<ul style="list-style-type: none"> The Corporate and Investment banking is a key driver for revenue as it contribute to 64% of the banks total income Their mobile banking platform is set to reduce costs associated with branch transactions 	<ul style="list-style-type: none"> Political instability in the countries they operate. The recent instability in S.Sudan proved to be a challenge as it affected their overall income Their expansion strategy is limited by the presence of Standard Bank in the region
I&M Bank	<ul style="list-style-type: none"> They have consistently been among the most efficient banks in Kenya from a survey released by Think Business Banking Awards They have also fully embraced internet bank in Kenya to further help drive their efficiency 	<ul style="list-style-type: none"> They have not been able to aggressively market themselves as a local household bank as Equity, Co-op and KCB They face stiff competition for clients from larger existing tier 1 bank in the SME and Retail sectors
HF Group	<ul style="list-style-type: none"> Vibrant real estate market in Kenya with an annual housing supply which does not satisfy demand The bank is the market leader in provision of mortgage financing 	<ul style="list-style-type: none"> Lack of a vibrant mortgage market in Kenya Competition from larger banks with Mortgage facilities poses a risk for growth Asset liability mismatch which forces the bank to resort to expensive financing

67



Source: Cytonn, 2016

Appendix 5: Cost to Income Ratio Global View



Source: S&P Global Market Intelligence | f

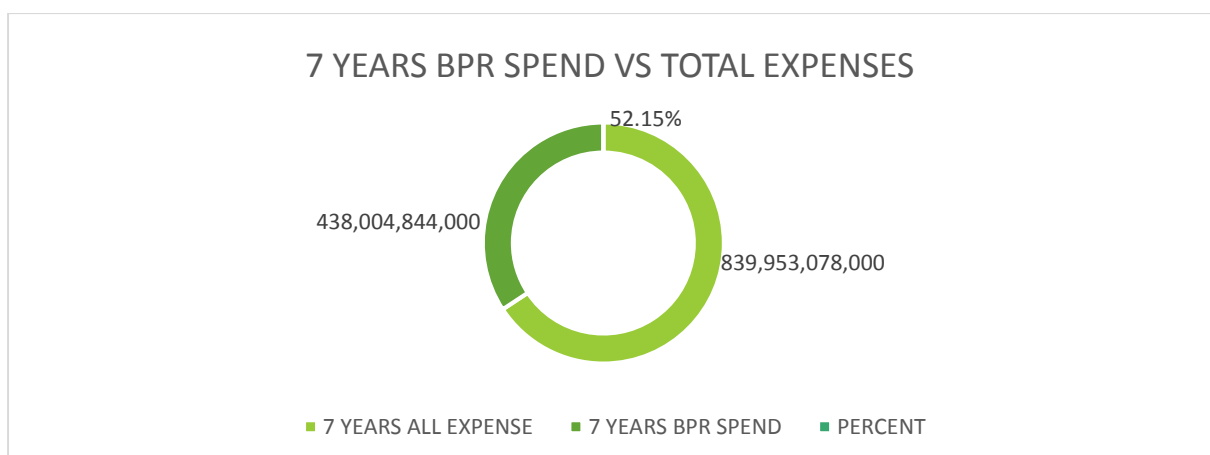
Source: S&P Global Intelligence, 2016

Appendix 6: Data Collection Tool

EXPENSES							
BANK\YR	2010(000)	2011(000)	2012(000)	2013(000)	2014(000)	2015(000)	2016 (000)
KCB	18,412,941	22,283,626	25,292,333	27,080,530	29,104,155	30,310,795	36,927,000
EQUITY	11,298,000	14,361,000	17,970,000	20,656,000	24,759,000	29,664,000	32,460,000
BBK	14,049,000	13,539,000	14,260,000	15,565,000	14,590,000	15,622,000	16,904,000
COOP	9,231,000	11,417,000	13,171,000	16,605,000	20,265,000	19,372,000	24,640,000
SCB	5,888,524	7,245,637	8,398,595	9,279,429	10,993,605	11,062,775	12,228,975
CFC	6,499,457	7,390,000	8,868,827	7,917,011	8,467,430	8,677,556	10,716,000
DTB	3,671,376	4,583,078	5,188,686	6,222,779	7,196,517	8,171,223	9,195,269
I& M	2,092,621	2,755,604	3,576,541	4,663,709	3,960,066	5,023,727	4,808,957
NIC	2,288,448	2,739,635	3,500,673	4,320,742	4,946,475	5,648,417	6171267
NBK	4,039,440	4,658,866	5,751,508	6,395,344	6,977,202	7,473,950	8,154,000
HFCK	855,711	1,031,089	1,128,524	2,160,498	1,906,551	2,608,766	2,642,618
TECHNOLOGY INVESTMENT VIEW							
BANK	2010(000)	2011(000)	2012(000)	2013(000)	2014(000)	2015(000)	2016 (000)
KCB	389,156	581,782	196,187	807,330	471,429	574,411	2,573,700
EQUITY	310,000	310,000	330,000	998,000	1,978,000	2,258,000	1736000
BBK	3,322,000	398,000	23,000	17,000	80,000	17,000	52,000
COOP	464,965	688,439	2,192,427	1,297,114	544,067	374,349	338,689
SCB	84,019	94,445	157,480	165,826	198,740	341,251	134,423
CFC	32,580	114,830	459,770	77,471	212,938	179,796	454,868
DTB	100,458	132,126	52,635	469,882	178,241	241,149	441,778
I& M	24,463	78,408	460,659	48,206	1,061,538	400,110	450,000
NIC	101,357	311,238	455,620	156,697	105,329	160,612	308,887
NBK	115,321	467,657	470,173	259,541	355,785	861,327	754,494
HF	1,659	2,021	10,131	396,410	137,889	308,832	566,062
PERFORMANCE (BOARD INVESTMENT)							
BANK	2010(000)	2011(000)	2012(000)	2013(000)	2014(000)	2015(000)	2016 (000)
KCB	100,401	145,592	171,558	296,964	197,395	262,770	128,000
EQUITY	447,000	473,000	627,000	329,000	469,000	612,000	590,000
BBK	83,000	101,000	138,000	148,000	123,000	119,000	84,000
COOP	89,887	100,472	83,552	131,734	161,129	193,413	163,742
SCB	88,030	136,534	124,138	142,356	166,154	132,567	162,493
CFC	20,340	33,111	73,324	36,842	51,203	68,640	37,895
DTB	59,769	62,147	65,924	83,747	89,126	109,471	116,645
I& M	21,583	33,111	73,324	98,908	167,216	25,083	57,741
NIC	105,853	117,582	163,882	216,631	220,398	247,042	235,510
NBK	63,420	58,769	75,438	137,711	77,109	84,160	98,906
HF	42,861	66,936	65,884	70,483	95,277	132,290	140,748
VALUE (TRAINING, DVPT, RESTRUCTURING)							
BANK	2010(000)	2011(000)	2012(000)	2013(000)	2014(000)	2015(000)	2016 (000)

KCB	9,383,643	10,883,679	11,861,196	16,761,394	14,334,196	15,617,987	17,719,000
EQUITY	5,266,000	6,009,000	7,172,000	9,043,000	10,814,000	10,206,000	11,694,000
BBK	6,678,000	5,841,000	6,394,000	6,572,000	7,083,000	7,972,000	9,837,000
COOP	4,493,620	5,511,355	6,118,728	8,109,031	9,850,641	9,041,078	9,403,441
SCB	3,736,761	3,394,945	4,649,299	5,094,655	5,915,544	6,218,282	5,144,158
CFC	1,196,757	1,484,091	1,815,058	2,436,801	2,071,868	2,463,697	5,440,000
DTB	1,889,747	2,223,548	2,400,082	2,879,896	3,169,226	3,594,144	2,979,044
I& M	1,196,757	1,484,091	2,147,205	2,552,375	1,764,767	2,463,697	2,044,429
NIC	1,262,277	1,598,250	1,978,651	2,367,508	2,560,942	3,063,909	3,516,000
NBK	2,308,971	2,671,225	3,121,564	3,570,349	3,710,269	3,598,280	3,543,438
HF	489,608	601,450	683,512	803,850	974,712	1,035,091	1,071,977
TECHNOLOGY INVESTMENT VIEW: RATIO=INVESTMENT/EXPENSE							
BANK\YEAR	2010	2011	2012	2013	2014	2015	2016
KCB	0.02	0.03	0.01	0.03	0.02	0.02	0.07
EQUITY	0.03	0.02	0.02	0.48	0.08	0.08	0.05
BBK	0.24	0.03	0	0	0.01	0	0
COOP	0.05	0.06	0.17	0.08	0.03	0.02	0.01
SCB	0.01	0.01	0.02	0.02	0	0.03	0.01
CFC	0.01	0.02	0.05	0.01	0.03	0.02	0.04
DTB	0.03	0.03	0.01	0.08	0.02	0.03	0.05
I& M	0.01	0.03	0.13	0.01	0.27	0.08	0.09
NIC	0.04	0.11	0.13	0.04	0.02	0.03	0.05
NBK	0.03	0.1	0.08	0.04	0.05	0.12	0.09
HF	0	0	0.01	0.18	0.07	0.12	0.21
INFRASTRUCTURE (BOARD INVESTMENT)RATIO=INVESTMENT/EXPENSES							
BANK\YEAR	2010	2011	2012	2013	2014	2015	2016
KCB	0.005	0.007	0.007	0.011	0.007	0.009	0
EQUITY	0.04	0.033	0.035	0.02	0.019	0.021	0.02
BARCLAYS	0.006	0.007	0.01	0.01	0.008	0.008	0
COOP	0.01	0.009	0.006	0.008	0.008	0.01	0.01
SCB	0.015	0.019	0.015	0.015	0.002	0.012	0.01
CFC	0.003	0.004	0.008	0.005	0.006	0.008	0
DTB	0.016	0.014	0.013	0.013	0.012	0.013	0.01
I& M	0.01	0.012	0.021	0.021	0.042	0.005	0.01
NIC	0.046	0.043	0.047	0.05	0.045	0.044	0.04
NBK	0.016	0.013	0.013	0.022	0.011	0.011	0.01
HF	0.05	0.065	0.058	0.033	0.05	0.051	0.05
VALUE (TRAINING, DVPT,RESTRUCTURING RATIO)=RATIO=INVESTMENT/EXPENSES							

BANK\YEAR	2010	2011	2012	2013	2014	2015	2016
KCB	0.51	0.49	0.47	0.62	0.49	0.52	0.48
EQUITY	0.47	0.42	0.4	0.44	0.44	0.34	0.36
BBK	0.48	0.43	0.45	0.42	0.49	0.51	0.58
COOP	0.49	0.48	0.46	0.49	0.49	0.47	0.38
SCB	0.63	0.47	0.55	0.55	0.54	0.56	0.42
CFC	0.18	0.2	0.2	0.31	0.24	0.28	0.51
DTB	0.51	0.49	0.46	0.46	0.44	0.44	0.32
I& M	0.57	0.54	0.6	0.55	0.45	0.49	0.43
NIC	0.55	0.58	0.57	0.55	0.52	0.54	0.57
NBK	0.57	0.57	0.54	0.56	0.53	0.48	0.43
HF	0.57	0.58	0.61	0.37	0.51	0.4	0.41
COST TO INCOME RATIO							
BANK	2010	2011	2012	2013	2014	2015	2016
KCB	0.63	0.6	0.57	0.52	0.5	0.52	0.53
EQUITY	0.6	0.56	0.51	0.49	0.48	0.47	0.51
BBK	0.57	0.51	0.52	0.56	0.52	0.53	0.53
COOP	0.64	0.66	0.6	0.6	0.63	0.59	0.52
SCB	0.4	0.41	0.46	0.42	0.41	0.45	0.57
CFC	0.51	0.51	0.51	0.51	0.5	0.51	0.58
DTB	0.54	0.48	0.43	0.43	0.44	0.41	0.38
I& M	0.38	0.38	0.38	0.38	0.37	0.37	0.35
NIC	0.44	0.42	0.42	0.52	0.46	0.54	0.38
NBK	0.75	0.75	0.75	0.75	0.7	0.78	0.74
HFCK	0.52	0.47	0.51	0.55	0.55	0.55	0.53



Appendix 7: Diagnostic Test Table

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances	=	11	Number of obs	=	77
Estimated autocorrelations	=	0	Number of groups	=	11
Estimated coefficients	=	4	Time periods	=	7
			Wald chi2(3)	=	12.00
Log likelihood	=	109.5385	Prob > chi2	=	0.0074

CIR	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
TECH	.1493475	.0577255	2.59	0.010	.0362077	.2624873
INFRA	-.8084571	.2345532	-3.45	0.001	-1.268173	-.3487413
VALUE	.0357444	.0531417	0.67	0.501	-.0684114	.1399003
_cons	.5218091	.0244695	21.32	0.000	.4738499	.5697684

Appendix 8: Panel Data

A	B	CIR	TECH	INFRA	VALUE	Banknum_01
KCB	2010	0.63	0.02	0.01	0.51	1
KCB	2011	0.6	0.03	0.01	0.49	1
KCB	2012	0.57	0.01	0.01	0.47	1
KCB	2013	0.52	0.03	0.01	0.62	1
KCB	2014	0.5	0.02	0.01	0.49	1
KCB	2015	0.52	0.02	0.01	0.52	1
KCB	2016	0.53	0.07	0	0.48	1
BBK	2010	0.56	0.03	0.04	0.47	2
BBK	2011	0.5	0.02	0.03	0.42	2
BBK	2012	0.51	0.02	0.03	0.4	2
BBK	2013	0.49	0.48	0.12	0.44	2
BBK	2014	0.52	0.08	0.02	0.44	2
BBK	2015	0.53	0.08	0.02	0.34	2
BBK	2016	0.53	0	0	0.58	2
CFC	2010	0.57	0.24	0.01	0.48	3
CFC	2011	0.51	0.03	0.01	0.43	3
CFC	2012	0.52	0	0.01	0.45	3
CFC	2013	0.56	0	0.01	0.42	3
CFC	2014	0.52	0.01	0.01	0.49	3
CFC	2015	0.53	0	0.01	0.51	3
CFC	2016	0.58	0.04	0	0.51	3
COOP	2010	0.64	0.05	0.01	0.49	4
COOP	2011	0.66	0.06	0.01	0.48	4
COOP	2012	0.6	0.17	0.01	0.46	4
COOP	2013	0.6	0.08	0.01	0.49	4
COOP	2014	0.63	0.03	0.01	0.49	4
COOP	2015	0.59	0.02	0.01	0.47	4
COOP	2016	0.52	0.01	0.01	0.38	4
DTB	2010	0.4	0.01	0.01	0.63	5
DTB	2011	0.41	0.01	0.02	0.47	5
DTB	2012	0.46	0.02	0.01	0.55	5
DTB	2013	0.42	0.02	0.02	0.55	5
DTB	2014	0.41	0	0	0.06	5
DTB	2015	0.45	0.03	0.01	0.56	5
DTB	2016	0.38	0.05	0.01	0.32	5
EQUITY	2010	0.6	0.01	0	0.18	6
EQUITY	2011	0.56	0.02	0	0.2	6
EQUITY	2012	0.51	0.05	0.01	0.2	6
EQUITY	2013	0.49	0.01	0	0.31	6
EQUITY	2014	0.48	0.03	0.01	0.24	6
EQUITY	2015	0.47	0.02	0.01	0.28	6
EQUITY	2016	0.51	0.05	0.02	0.36	6
HF	2010	0.54	0.03	0.02	0.51	7

HF	2011	0.47	0.03	0.01	0.49	7
HF	2012	0.51	0.01	0.01	0.46	7
HF	2013	0.55	0.08	0.01	0.46	7
HF	2014	0.5	0.02	0.01	0.44	7
HF	2015	0.53	0.03	0.01	0.44	7
HF	2016	0.53	0.21	0.05	0.41	7
I&M	2010	0.38	0.01	0.01	0.57	8
I&M	2011	0.38	0.03	0.01	0.54	8
I&M	2012	0.38	0.13	0.02	0.6	8
I&M	2013	0.38	0.01	0.02	0.55	8
I&M	2014	0.37	0.27	0.04	0.45	8
I&M	2015	0.37	0.08	0	0.49	8
I&M	2016	0.35	0.09	0.01	0.43	8
NIC	2010	0.44	0.04	0.05	0.55	9
NIC	2011	0.41	0.05	0.04	0.58	9
NIC	2012	0.42	0.05	0.05	0.57	9
NIC	2013	0.41	0.04	0.05	0.55	9
NIC	2014	0.43	0.02	0.04	0.52	9
NIC	2015	0.41	0.03	0.04	0.54	9
NIC	2016	0.38	0.05	0.04	0.57	9
NBK	2010	0.75	0.03	0.02	0.57	10
NBK	2011	0.75	0.1	0.01	0.57	10
NBK	2012	0.75	0.08	0.01	0.54	10
NBK	2013	0.75	0.04	0.02	0.56	10
NBK	2014	0.7	0.05	0.01	0.53	10
NBK	2015	0.78	0.12	0.01	0.48	10
NBK	2016	0.74	0.09	0.01	0.43	10
SCB	2010	0.52	0	0.05	0.57	11
SCB	2011	0.47	0	0.06	0.58	11
SCB	2012	0.51	0.01	0.06	0.61	11
SCB	2013	0.55	0.18	0.03	0.37	11
SCB	2014	0.55	0.07	0.05	0.51	11
SCB	2015	0.55	0.12	0.05	0.4	11
SCB	2016	0.57	0.21	0.05	0.41	11

APPENDIX 9: Normality Tests PP and QQ Plots

