BIG DATA ANALYTICS AND COMPETITIVE ADVANTAGE OF COMMERCIAL BANKS IN KENYA

BY

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ABSTRACT

This research investigated the effects of big data analytics to the competitive advantage of commercial banks in Kenya. A descriptive survey design was applied to attain objectives of the study. The target population included the workers in 42 commercial banks and one mortgage finance company. The study used primary data, that was gathered using a semi-structured questionnaire. Descriptive statistics and regression analysis was used to analyse data. The study established that a statistically significant connection exists between competitive advantage of commercial banks, the dependent variable and use of big data analytics independent variables; descriptive, predictive, prescriptive analysis and data mining. It further discovered that taking all other independent variables at zero, a 1% rise in use of big data analytics leads to improved competitive edge of commercial banks. Finally, the study established that new revenue opportunities, improved decision making, improved risk management initiatives, customer retention in commercial banks were a consequence of using big data analytics. The recommended that commercial banks should benchmark to borrow the best data analytic techniques and source for new best data technology so as to be competitive. It also recommended further studies to be done big data analytics techniques and competitive advantage of commercial banks.

TABLE OF CONTENTS

DECLARATION ..... **ii**

DEDICATION ..... **iii**

ACKNOWLEDGEMENT ..... **iv**

ABSTRACT ..... **v**

LIST OF TABLES ..... **x**

ABBREVIATIONS AND ACRONYMS ..... **xi**

CHAPTER ONE: INTRODUCTION **1**

1.1 Background of the study **1**

1.1.1 Big Data Analytics 2

1.1.2 Competitive Advantage 2

1.1.3 Commercial Banks in Kenya 3

1.2 Statement of the Problem **4**

1.3 Objectives **6**

1.4 Value of the Study **6**

CHAPTER TWO: LITERATURE REVIEW **8**

2.1 Introduction 8

2.2 Theoretical Framework 8

2.2.1 Resource Based Theory 8

2.2.2 Technology Diffusion Theory 9

2.2.3 Knowledge-Based Theory 10

2.3 Big Data Analytics 11

2.3.1 Benefits of Big Data Analytics 13

2.3.2 Challenges of Big Data Analytics 14

2.4 Empirical studies on Big Data Analytics and Competitive Advantage 16

2.5 Summary of Literature 19

2.6 Conceptual Framework 20

CHAPTER THREE: RESEARCH METHODOLOGY 21

3.1 Introduction 21

3.2 Research Design 21

3.3 Population 21

3.4 Data Collection 21

3.5 Data Analysis 22

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION 23

4.1 Introduction 23

4.1.1 Response Rate 23

4.2 Demographic Information 23

4.2.1 Gender 24

4.2.2 Age Distribution 24

4.2.3 Level of education 25

4.2.4 Department of the Bank 25

4.2.5 Years of operation of the bank. 26

4.2.6 Bank branches 27

4.2.7 The ownership of the firm 27

4.2.8 Number of Employees 28

4.2.9 Asset Base of the Bank 28

4.2.10 Customers of the Bank 29

4.3 Big Data Analytics 30

4.3.1 Commercial Bank Big Data Analytics initiatives 30

4.3.2 Big Data Analytics adopted by Commercial 30

4.3.3 Technology for Data Analytics 31

4.3.4 Big Data Analytics 32

4.4 Benefits Banks Get from using Big Data Analytics 33

4.5 Challenges Banks Face using Big Data Analytics. 34
4.6 Regression Analysis 36
4.7 Discussion of the finding 38
CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS 40
5.1 Introduction 40
5.2 Summary of findings 40
5.3 Conclusion 41
5.4 Policy Recommendations 42
5.5 Limitations of the Study 42
5.6 Recommendation for Further Research 43
APPENDICES 47
Appendix I: Research Questionnaire 47
Appendix II: List of Commercial Banks in Kenya 54

LIST OF TABLES

Table 4.1: Gender of the Respondent 24

Table 4.2: Age Distribution 24

Table 4.3: Level of education 25

Table 4.4: Level of education 25

Table4. 5: Years of operation.....26

Table 4.6:Bank branches.....27

Table 4.7: Ownership of the firm.....28

Table 4.8: Number of Employees 28

Table 4.9: Asset base of the Bank.....29

Table 4.10: Customers of the Bank.....29

Table 4.11: Commercial Bank Big Data analytics initiatives.....30

Table 12: Data Analytics Technique.....30

Table 13: Technology for Data Analytics.....31

Table 4.14: Big Data Analytics.....32

Table 4.15: Benefits Banks Get from using Big Data Analytics 33

Table 4.16: Challenges Banks Face using Big Data Analytics.....35

Table 4.17: Regression Model Summary.....36

Table 4.18: Anova a.....36

Table 4.19: Regression Coefficients Table.....37

LIST OF TABLES

Table 4.1: Gender of the Respondent 24

Table 4.2: Age Distribution 24

Table 4.3: Level of education 25

Table 4.4: Level of education 25

Table4. 5: Years of operation..... 26

Table 4.6:Bank branches..... 27

Table 4.7: Ownership of the firm..... 28

Table 4.8: Number of Employees 28

Table 4.9: Asset base of the Bank..... 29

Table 4.10: Customers of the Bank..... 29

Table 4.11: Commercial Bank Big Data analytics initiatives..... 30

Table 12: Data Analytics Technique..... 30

Table 13: Technology for Data Analytics..... 31

Table 4.14: Big Data Analytics..... 32

Table 4.15: Benefits Banks Get from using Big Data Analytics 33

Table 4.16: Challenges Banks Face using Big Data Analytics..... 35

Table 4.17: Regression Model Summary..... 36

Table 4.18: Anova a 36

Table 4.19: Regression Coefficients Table 37

ABBREVIATIONS AND ACRONYMS

BDA	Big Data Analytics
CA	Competitive Advantage
CBK	Central Bank of Kenya
IT	Information Technology
RBV	Resource Based View
ROA	Return on Asset
ROI	Return on Investment
SCA	Sustainable Competitive Advantage

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The amount of data being produced the world over has been increasing exponentially because of a number of correlated explanations (Dumbill, 2012). There is widespread proliferation of accumulating data exponentially and wish to produce extra worth from it (Barnatt, 2015). Historically organizations have been collecting vast amounts of data just for the sake of it. Businesses that are using big data effectually are seizing tremendous value in customer retention, targeted marketing, fraud reduction, internal operation, and many other areas (Manyika et al., 2011). With large amounts of information flooding in from innumerable sources, organizations are faced with finding new and innovative ways to manage and make use of big data.

Elections are known as the most perceptible element of democracy since they connect citizens to the government and ensure the political arena is controlled by the citizens. Even though democracy is not in itself a guarantee, as Khabele has rightly observed, elections are still termed as one of the main pillars of democracy. Its key functions include ensuring a legitimate political system, smooth succession of governments and other top leaders, serves as a link to political institutions to the voters and peaceful conflict settlements plan.

The importance of elections in the modern world needs to start an institution to manage the elections. The critical importance of and the continuing need for such a body was aptly captured by Goodwin when he observed that ‘experience and current state run-through approves of the need for oversight to overlook the electoral process’. This position is also captured by the Organisation of African Unity (OAU)

(now African Union (AU)) Declaration on the Principles Governing Democratic Elections in Africa of 2002

1.1.1 Big Data Analytics

Election Management Bodies (EMBs) were formed throughout the world with the given the responsibility to overlook elections. Nevertheless, creating an institution to overlook and conduct elections does not enhance public confidence and reliability to the electoral process. The operation and foundation of the electoral bodies have to meet certain requirements to get credible election administration. One of the requirements include an EMB to be an independent institution from any given party. Having independent EMB's is said to build up confidence to stakeholders in the electoral process.

In Africa, elections have gained momentum over the last fifteen years since the wave of democratisation began sweeping across the continent in the early 1990s, which resulted in multi-party elections in many African countries. These waves of democratisation made Barkan to comment that the existing round of elections hold out the likelihood for the internalisation of a democratic electoral systems to an level where they are held up as the first or the second in a chain of contests. Multiparty competitive elections are growing to be the norm rather than an exclusion in Africa. This is happening in nations where the electoral process has been compromised or the electoral process has not brought change. Having a free and fair electoral process has become something every country is striving at.

1.1.2 Competitive Advantage

Elections have transformed to be vital aspects on the African political arena. This has been so particularly since the early 1990s when the phenomenon of

competitive politics was introduced on the continent. Udombana has observed that by August 2000, multiparty elections were the ones being used in almost all the African countries. Conversely, there are some occurrences where election malpractices have been reported due to the EMBs not being independent.

Even though it is important to admit that there does not exist an electoral system that is without flaws and that there are democracies which are established from election irregularities, the current situation in the African continent is wanting and in need of changes if legit democracies are to be established. The critical areas that need reforms are financial self-sufficiency, operations independence and appointment to office of the commissioners in the EMBs. These three essential elements have made the bodies lack independence and unable to attain their goals. This has been compounded by the nature of politics in Africa where some leaders seek to entrench themselves in power for life, a phenomenon that Thomson has called the 'Big Man' syndrome.

Equally, scholars of comparative politics are increasingly appreciating that effective electoral cycles are essential for credible elections. Manzuli in his study on electoral governance: understanding the democratic quality of elections in Nigeria, stated that, electoral processes in pre-, during and post-election periods are central to the validity of any election as a failure in one of the sequences of the electoral cycle could damage the achievements recorded at the previous levels. Also, recent research on democratic elections in Africa by Morse highlights the relevance of electoral governance indicating that the quality of an electoral contest is institutionally constrained.

1.1.3 Commercial Banks in Kenya

A bank is a financial institution that takes deposits from the public and advances credit. In Kenya, banking plays a dominant role in the financial services sector, predominantly in the mobilization of savings and provision of credit. Central Bank of Kenya (CBK) prudential guidelines necessitates that banks store and analyze many years of transaction data. This requirement helps deter the unlawful practices of money laundering and terrorism financing.

In their endeavor of meeting regulatory demands, banks are increasingly collecting and accumulated enormous quantities of data. This data can then be analyzed or mined and incorporated in their risk management framework. In the past, banks have seldom analyzed the data they generate when interacting with customers. Now, with big data analytics they are finding new ways to analyze their customer interactions to discover who is unhappy and about to leave and thus come up with appropriate strategies to bolster customer retention. Being able to identify and take steps to retain customers who are about to leave can mean better performance for banks.

Big data analytics is playing a critical role in helping banks gain competitive advantage in areas of customer scoring and segmentation, lead generation, and thwarting fraud attempts. Credit card fraud alone cost banks $14 billion in 2013, and it has increased consistently over the last five years (Cicero, 2016). Fraud detection capabilities have dramatically increased in the last decade but must constantly evolve to keep up with fraudsters. Banks can capture competitive advantage using big data.

1.2 Statement of the Problem

Data can create considerable value for the world economy, enhance the efficiency and competitiveness of corporations and generating substantial economic surplus for

consumers however the potential and promise of Big Data is underestimated in Kenya's Commercial banking sector (Lehdonvirta & Ernkvist, 2011). This perhaps is because of a lack of requisite talent and investment in acquisition of new technologies to mine big data. Organizations can gain competitive advantage by mining the data they gather about their customers which can give business insights and assist to improve performance and confer competitive advantage to businesses (Morgan, 2017). Present day technologies have made it possible to analyse big data in a faster and cost-effective manner. It therefore has become hustle free to extract valuable insights from data, even for the small banking institutions (Cotte, 2012).

Swoyer (2012) argued that prevailing definitions of big data miss out on the most significant aspect, which is how big data creates business value for organizations and improve overall performance. The author recommended further empirical research to be done on benefits of data management to the banking industry in capture tremendous value in customer retention, targeted marketing, fraud reduction, internal operations optimization and complying with new regulatory requirements of the Central Bank of Kenya and helping banks to derive business value (Oracle, 2012). Implementing big data analytics initiatives can help Kenyan banks to identify strategic opportunities and at the same time acquire a competitive advantage (Ohlhorst, 2012). This study attempted to answer the following question. Is there any relationship between big data analytics and the competitive advantage of commercial banks in Kenya?

1.3 Objectives

The general objective of the study was to investigate the influence of big data and analytics on the competitive advantage of commercial banks in Kenya and specifically to:

i. Determine the extent to which commercial banks in Kenya are using big data analytics.

ii. Establish benefits the banks get from big data analytics.

iii. Establish the challenges faced by banks using big data and analytics

iv. Determine the relationship between big data analytics and the competitive advantage of banks in Kenya.

1.4 Value of the Study

The outcome of this study benefits the executives in the banking sector in making informed decisions on how to use big data to effectively capture tremendous value in customer retention, targeted marketing, fraud reduction, and improving operational effectiveness and meet regulatory and compliance requirements. They are able to deliver improved actionable insight during customer interactions with their contact centers.

In the efforts to combat fraud, Big data provides the Banking Fraud Investigation. The study offers a basis for other academic investigations by future academicians and researchers into the area of big data analytics in Commercial banks in Kenya**.**

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter covers the theoretical framework, concept of big data analytics, the benefits of big data analytics, challenges of big data analytics and empirical studies on big data analytics and competitive advantage.

2.2 Theoretical Framework

This research was guided by the following theories/or models

2.2.1 Resource Based Theory

Election management body (EMB) is the authority charged with administering the electoral process. Due to the difficult and extraordinary skills appropriate to manage the electoral process, a specific establishment to be accountable for managing the electoral undertakings is being required. Such bodies have a variety of forms and dimensions, with several titles which include; Electoral Commission, Electoral Council, Electoral Unit, Department of Elections, Electoral Board…etc. Hartlyn asserts that the election or voting in general is known to be the most common activity to be organized and prepared in a democratic country. It is a multifaceted administrative operation, executed in a politically active atmosphere.

Traditionally, the body that managed multiparty elections in a democratic country has not been newsworthy and kept under low profile comparing to other political activities. The accomplishment of numerous electoral processes basically passed without being seen, except by those directly get influenced like the political parties who lost when they set their complaints against the election conduct and results. However, this situation began to change within the last quarter of century. The

administrative details of elections conducted in a democratic manner started to be perceived and reported as a central issue to measure; the rights of individuals to vote and participate in governance, sustainability and transparency of democratic process, changes from authoritarianism reconciliation, resolving conflicts etc. Electoral management were more scrutinized by the media, international observers, political parties and even the domestic observers.

During the same period, there have also been exceptional electoral restructurings worldwide, determined by perception in political elites that changing political and social settings needed a change of mind and improvement of electoral management, by the precarious attention of the academic institutes, rise of regional and global institutions that promote democracy, media and those who observe the election. At that time, the lack of credibility and diminished public confidence in elections result, and thus in electoral management, was an outcome for the lack of know-how and the knowledge gap in administrative instruments and technical to oversee elections, this factor was surpassed by many electoral institutions in many democracies as important motivation to achieve electoral management reforms.

Although many democratic states have been focusing on electoral systems reform to improve demonstration, the changes in the instruments for establishing and managing electoral processes have been very vital. They comprise of the establishment of independent electoral management insttutions with a verse range of authorities and accountabilities, and the enhancement of efficiency for electoral management bodies to convey better excellent electoral process while at the same time improving the electoral procedure to be free and fair.

2.2.2 Technology Diffusion Theory

Technology diffusion theory was invented by Everett Roger in 1960s as a buildup of Innovation diffusion theory therefore it is closely related to Innovation diffusion theory. Technology diffusion theory refers to the process by which technology spreads to general applications and from one economy to the next, one entity to the next, one nation to the next and one user to another prospective user. Technology diffusion is a measure of how widely technology is spread throughout an organization. There are two main approaches to Technology diffusion theory; Top-down/traditional approach where the introduction of technology is mandated by the management mostly because most of the technology is not available for individual use or private use due to the scope of application. Bottom-up/ grass root approach is where technology is readily available and individuals can use it to serve their own purpose. There are five main participants; Innovators: innovative organizations that follow innovation strategy (2.5%). Early adopters:. This maybe amongst major competitors (13.5%). Early majority: These are people/ organizations with many social networks and tend to be guided more by practical consideration (34%). Late majority: This refers to people who are less comfortable with technology (34%). Laggards: This refers to people who may never adapt to the new technology (16%).

Technology diffusion theory was used in this study to determine the extent to which Big Data analytics has been adopted in organizations in the banking sector.

2.2.3 Knowledge-Based Theory

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As a term, election management institution has been made to refer to the institution that ensures the electoral process runs smoothly no matter the institutional framework used. EMB is an institution or institute which sole purpose is to legally

manage all important elements to have a smooth electoral process or any activities that show democracy, for instance referendum, recall votes and initiatives by citizens.

2.3 Big Data Analytics

This data is referred to as “big data” since of its velocity, volume and the several of forms it takes (Manyika et al., 2011). Companies are be familiar with the prospective value of this data thus putting people, procedures in place to capitalize on the opportunities. Currently, many organizations are accumulating, storing, and analyzing enormous quantities of data. Big data and analytics are entwined, nonetheless analytics is not new. Many analytic methods, such as learning machine, simulation and regression analysi, have existed for several years. Big data is resulting in a new generation of decision support data management.

According to O’brien, the providing the right conditions for a given service is a requirement for EMBs to be independent. The right conditions are needed for the commissioners to be able to work without fear of being dismissed or prosecuted. Conditions of service include; terms of office, salaries, legal aspects on immunity and allowances. The law has to provide for the commissioners accordingly due to the importance of conditions of service. An independent body needs to do regular reviews on terms of services. This is so as to reduce the number of times the executive is involved, which if they are so much involved can undermine EMBs independence. Thus, terms of service have to be detailed and not too short and not too long too.

In addition, as O’brien has proposed, the term of office must not coincide with the normal term of an elected government. The commissioners’ compensation needs to strengthen integrity status, professional status and independence. Commissioners need to be protected from any legal deed that comes from any activity in while in

official duty. This ensures they work without being intimidated, without fear or favour. Nevertheless, immunity must not cover any cases of corruption.

2.3.1 Benefits of Big Data Analytics

EMBs effectiveness can be influenced through resource (financial) availability. This is because elections uses a lot or resources. The requirement for financial autonomy ensures that an EMB has access to adequate financial resources to enable it performs its functions effectively. It also means that an EMB has control over its financial resources and determines their use. It is, therefore, significant that an EMB revel in financial independence from the government. The independence of an EMB can be affected by the distribution or timing of discharge of resources to it by the government. This can be done by making certain financial autonomy is by allowing it to prepare its own budge

Financial autonomy ensures EMBs set up their precedences and other activities and put in effort to attain them in time without any distractions. It also ensures resources are raised from toher sources other than the government. On the other hand, independence of EMB is not absolute. It does not mean it is completely independent from the government. There is a possibility that this method could bring in negative consequences. EMBs have to work with other government agencies for them to attain their goals and objectives, however, this should not affect it's independence. (Brown, Chui, and Manyika, 2011).

While it's imperative for every organization to engage in risk management, the need may be largest in the financial services industry (Davenport, 2013). Financial services

institutions and banks similarly manage their customer risk through analysis of comprehensive customer portfolios. The risks of algorithmic trading are managed through back testing strategies against historical data. Big data analysis can also support real-time alerting if a risk threshold is exceeded.

Financial institutions and banks operate within a tight regulatory framework which requires substantive levels of monitoring and reporting. This data is analyzed using big data analytics and is used for trade surveillance that recognizes abnormal trading patterns. (Hussain and Prieto, 2016)

2.3.2 Challenges of Big Data Analytics

It is significant, to note that the independence of EMBs does not affect their accountability. Santiso asserts that, granted with their independence, EMBs still remain state institutions which conduct public functions. They must, therefore, be accountable to the state and the public. One of the ways of ensuring accountability is through the reporting process whereby they submit their annual reports to the legislature for scrutiny. The annual reports usually contain detailed accounts of their activities. This process is necessary since it helps in maintaining public confidence in EMBs and ensures that they perform their functions effectively. It also ensures that they use public funds appropriated to them for the intended purposes.

The auditing of the financial accounts of EMBs by the Auditor-General is another way of making them accountable. Since EMBs are state institutions, their financial accounts must be audited by the Auditor General to ensure to ensure financial probity. Finally, EMBs also need to be accountable to the public through the publication of their reports or through other mechanisms. For instance, the dissemination of newsletters, pamphlets or booklets on their activities to the public is

likely to foster public understanding of their activities. They can also ensure accountability through the assessment of their performance by the public.

Closely tied to privacy is the immense risk of security of the data collected and analyzed. Therefore, the production of more and more data increases security and privacy concerns. Thus, making it essential for analysts and data scientists to consider these issues and deal with the data in a manner that will not lead to the disruption of privacy. The tools used for analysis, stores, manages, analyses, and utilizes the data from a different variety of sources. This ultimately leads to a risk of exposure of the data, making it highly vulnerable (Michaelides, 2015).

2.4 Empirical studies on Big Data Analytics and Competitive Advantage

Arora & Rahman (2016) in their study of using big data analytics for competitive advantage observed that big data if harnessed appropriately can give firms significant opportunities in meeting their customer's needs in unique ways and thus achieving sustainable profitability. They developed a theoretical model on how big data can be used to enhance the performance of a firm. Arora & Rahman (2016) posit that big data on its own cannot confer competitive advantage to a firm. Competitive advantage is gained if a firm is capable of combining its various sources of data that make up big data in unique ways in conjunction with other complementary firm assets in way that is aligned to the strategy of the firm it would prove difficult for competition to imitate.

One of the limitations of this study is that the conceptual model was supported by past literature and it recommended further testing of the robustness of the model empirically in future research. The study did not look into the aspect of protection of customer data and privacy of the same and it recommended further research in this area.

Prescot (2016) asserts that for firms to compete using big data analytics it takes more than just using data science and mining techniques and knowledge to discover patterns and insights in raw data. The data and insights on their own are not adequate to allow a firm to gain a competitive advantage. To build an SCA a firm must build its advantage from its resources both tangible and intangible that are imperfectly mobile (Peteraf, 1993). These resources are firm precise, path dependent, tacit, and are socially intricate. They are built from organizational learning and experience using organizational information and knowledge.

The limitations of this study are that since this study was based on a single case-study within a specific industry (global information/media analytics), its findings warrant further investigation before they can be generalized across all industries. Thus, it recommends that the findings and model be used as a foundation for additional research across other industries to obtain a better understanding of the role of BDA as a dynamic capability in business strategy and competitive advantage.

Galletti & Papadimitriou (2013) investigates how Big Data Analytics (BDA) can be perceived and used as a driver of competitive advantage (CA) in firms using synergistic relationships with other resources. In this study, the authors assert that there's evidence that implementation of big data analytics is a key driver of CA even though the process is still in its infant stage. Increasingly companies are putting efforts to successfully implement BDA as a strategic tool for departments within organizations however there are several hurdles that threaten to impede the process (Galletti & Papadimitriou, 2013). Big Data technologies cannot operate in isolation, but need persons with the requisite skills, knowledge, capability and mandate, along with management support in order to deliver the SCA to a firm (Holmstrand, 2013). The limitations of this study included 1) the study was based on a limited number of

interviews, which might not have represented the entire picture of the organization, which can be better captured in further studies. 2) The investigation on the apparent organizational effects of a phenomenon that is very new and consequently firms engaged in BDA are still in the early stages of that process. Therefore, it suggested that the effects of BDA on the competitiveness of a firm should also be studied in the future, when companies would have developed there BDA capabilities to derive CA from them.

Big data analytics solutions are considered to be an emerging technology that can support businesses to improve their performance (Lee, Chai, Kweon and Kim, 2017). In the process of apportioning resources firms need to be deliberate in making investments in big data analytics solutions having realized the economic value of big data analytics. Lee, Chai, Kweon and Kim (2017) in the study "Does Implementation of Big Data Analytics Improve Firms' Market Value? Investors' Reaction in Stock Market" propose that those firms that invest in big data analytics solutions are looked upon favourably by investors in stock market. The limitation of the study was the small number of samples since big data analytics is still new and emerging with a short use period, the research could not gather an adequate number of announcements. By considering return on asset (ROA) and return on investment (ROI) of organizations future research should focus on measuring long-term effects of adopting big data analytics solutions (Lee, Chai, Kweon and Kim, 2017).

2.5 Summary of Literature

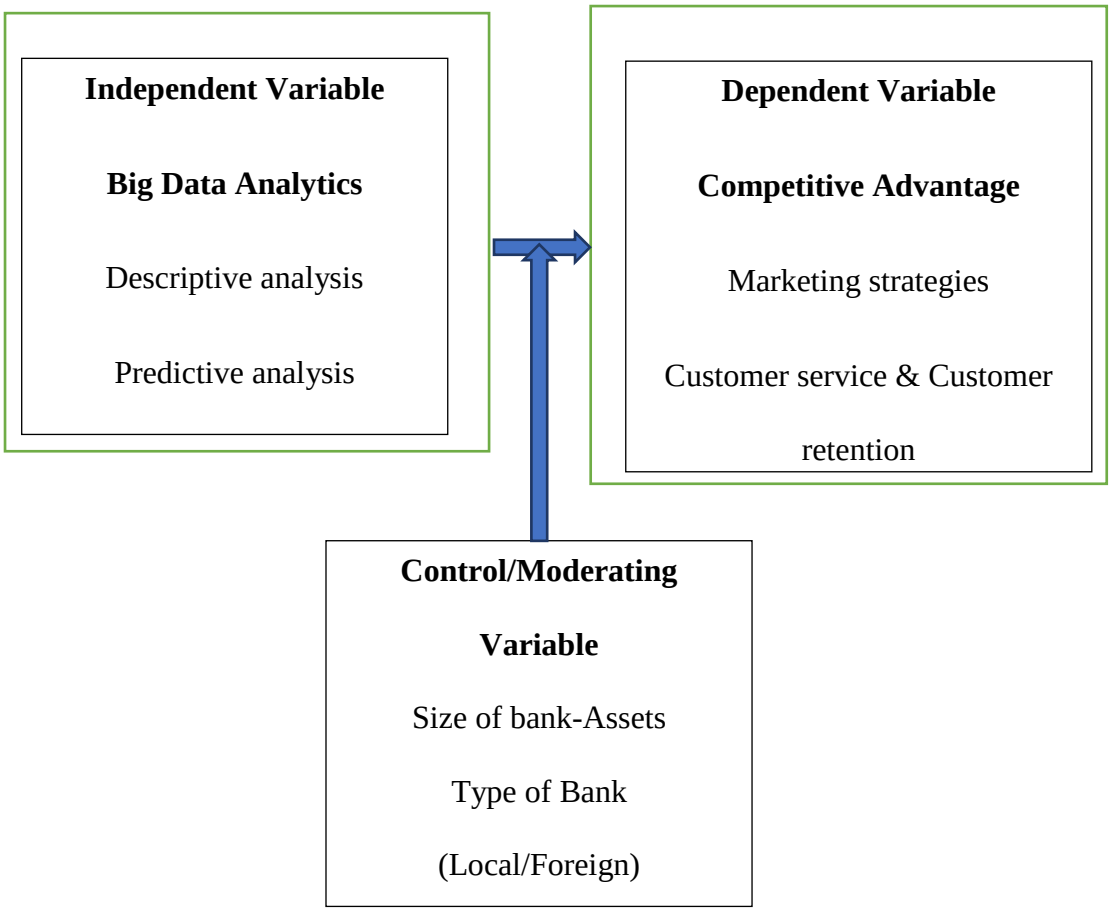
In this paper, a conceptual model that explains how to use big data analytics gain competitive advantage was developed. The different constructs that can provide competitive advantage used in this model were identified and discussed. Using

resource based view, technology diffusion and knowledge-based theories as theoretical lens to analyse this model to determine big data analytics in conjunction with other firm resources (tangible and intangible) and capabilities can provide strategic advantages to organizations.

2.6 Conceptual Framework

The model demonstrates the conceptual framework of the study and how big data analytics has impact on the competitive advantage in Kenyan commercial banks.

Figure 1.1: Conceptual Framework



Source: (Researcher, 2017)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the Research methodology that was used in this particular study. It covers research design, target population, data collection, and data analysis techniques.

3.2 Research Design

The study used descriptive survey method. This method was selected because of the collection of quantitative data which was key to this study. This method was the most appropriate for collecting information that brought out the BYOD phenomenon and the impact it has on employee productivity at the chosen firms. The method was suitable for describing the BYOD situation within a banking institution.

3.3 Population

The target population comprised of a census targeting all the 42 commercial banks and 1 mortgage finance company operating in Kenya (CBK, 2017).

3.4 Data Collection

The primary data was collected using a structured questionnaire (Appendix I). The questionnaire was administered through physical delivery and email. The questionnaire had four sections. Section A captured Personal details of respondent's details, Section B covered objective one, which looked at the extent of Big Data Analytics use in Commercial banks in Kenya, Section C covered objective two which was establishing benefits banks derive from big data analytics, Section D looked at

the challenges faced by banks using big data analytics and Section E aimed determine the relationship between big data analytics and the competitiveness of banks in Kenya.

3.5 Data Analysis

Objectives 1, 2 and 3 used descriptive analysis. Objective 4 used the following regression model;

$$\mathbf{Y=a_0+X_1a_1+X_2a_2+e}$$

Whereby

Y = Competitive advantage

X_1 = Data Analytics Use

X_2 = Characteristics of the bank

e = error term

a_0 = Constant

a_1 and a_2 are regression coefficients

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents data analysis and discussions. The general objective of the study was to investigate the influence of big data and analytics on the competitive advantage of commercial banks in Kenya.

4.1.1 Response Rate

The study used a sample of 80 respondents. 74 filled and gave back the questionnaires making the response rate to be 93%. Having a 93% response rate was satisfactory enough for making a discussion and concluding the study. A response rate of 50% is acceptable for analysis. A response rate of 60% is good while a response rate of 70% is termed as excellent (Mugenda and Mugenda, 1999). From these factual assertions, the response rate in this study was excellent.

4.2 Demographic Information

This section analysis the demographic information of the respondents.

4.2.1 Gender

The study sought to establish the gender category of the respondents. Results are show in table 4.1

Table 4.1: Gender of the Respondent

Gender	**Frequency**	**Percentage Frequency**
Male	23	62.2
Female	14	37.8
Total	**37**	**100.0**

To establish and promote democracy, the bodies concerned with elections engage or delegate others to fully commit themselves on civil education so as to train and educate people the poll. They again contribute in improving democratic process through ensuring asked valueable services to the voters

4.2.2 Age Distribution

The age groups are observed to hold different opinions on different issues. In this essence the study requested the respondents to indicate their age category. Results on age distribution are shown in table 4.2 below.

Table 4.2: Age Distribution

Age Distribution	Frequency	Percentage
20 to 30years	5	13.5
31 to 40 years	12	32.4
41 to 50 years	15	40.6
51 years and above	5	13.5
Total	**37**	**100.0**

Monitoring of how the relevant authorities function in the case where the electoral body does not play a part in giving out political permits for the political processions and the activities entailed therein is very key. Between 31-40 years, 13.5% were 51years and above whereas 13.5% of the respondents indicated that they were below 30 years.

4.2.3 Level of education

Individual level of education is highly associated with problem solving ability and approach to challenges. Results are analyzed in table 4.3

Table 4.3: Level of education

Education level	Frequency	Percentage
Diploma	4	10.8

Degree	18	48.6
Master's Degree	10	27.1
PhD	5	13.5
Total	**37**	**100.0**

The IEBC and NEC in every stage of electoral procedure, play a critical role in voter registration, all the logistics involved in distributing voters card and verification of the voters' roll. For voters roll to be reliable, it is the role of EMBs to look into it regularly through timely exposition to the scrutiny of the public before the poll. Encouragement to the persons representing the different parties to register for voting is done and every party and the independent candidates should be provided with a copy list of the registered voters in every constituency. For each vote to count and have the greatest equal impact, the electoral districts are made known and "gerrymandering" is done away with. EMBs have a big part to play so as to create a very good atmosphere for conducive campaigns, fair, partial, credible and valid poll. For this, there is need for coming up with written code of conduct with guidelines on how the concerned parties should carry out their poll activities4.2.4 Department of the Bank

The researcher sought to determine the bank departments in which the respondents worked in. The Table 4.4 below summarizes the responses.

Table 4.4: Level of education

Department	**Frequency**	**% Frequency**
Human Resources	3	8.1
public relation department	4	10.8
Finance department	6	16.2

Information Technology	15	40.5
Maintenance	2	5.4
Security department	7	18.9
Total	**37**	**100.0**

The findings show that a majority of the respondents (40.5%) worked in the information and technology department. 18.9% and 16.2% of the respondents worked in the systems security and Finance department respectively. In addition the results indicate that 10.8% and 8.1% of the respondents work in the public relations and human resource department. Moreover, 5.4% of the respondents who participated in the study indicated that they worked in the maintenance department. The sampled respondents was representative of all the major departments and those that are directly related with the impacts of big data analytics.

4.2.5 Years of operation of the bank.

The researcher sought to determine the years of operation of the banks. The Table 4.4 below summarizes the responses.

Table4. 5: Years of operation

Years of operation	Frequency	% Frequency
< 15 years	5	13.5
16 to 20 years	13	35.2
21 to 30 years	10	27.0
30 years>	9	24.3
Total	**37**	**100.0**

From the findings majority (35.2%) of the respondents indicated that most of the firms had operated for 16 to 20 years, 27.0% indicated 21 to 30 years and 24.3% indicated 30 years and above while 13.5% indicated below 15 years.

4.2.6 Bank branches

The study further sought to establish the number of branches each commercial bank has managed to establish. The respondents were requested to indicate the number of branches their bank has. Table 4.5 shows the results.

Table 4.6:Bank branches

Number of Branches	Frequency	% Frequency
Below 10	4	10.8
10 to 50	8	21.6
Above 50	25	67.6
Total	**37**	**100.0**

The findings in table 4.5 indicates that 67.6% of commercial banks have more than 50 branches, 21.6% have 10 to 50 branches whereas 10.8% have less than ten branches. This indicates that most of the commercial banks have spread all over the county and therefore they are in a position to offer better service to the people at their convenient places.

4.2.7 The ownership of the firm

On ownership of the commercial banks in Kenya, the study revealed that most of commercial banks in Kenya are owned locally as shown as by 67.6% whereas only 32.4% are foreign owned. Table 4.6 below summarizes the results.

Table 4.7: Ownership of the firm

Ownership	Frequency	Percentage
Foreign	12	32.4
Local	25	67.6
Total	**37**	**100.0**

4.2.8 Number of Employees

Table 4.7 shows the number of people employed in the commercial banks in Kenya.

Table 4.8:Number of Employees

Number of Employees	Frequency	Percentage
< 100	2	5.5
101-150	5	13.5
151-200	7	18.9
201-300	13	35.1
Over 300	10	27.0
Total	**37**	**100.0**

The study established that majority (35.1%) of the commercial banks in Kenya have 201 to 300 employees, 27.0% of commercial banks in Kenya have over 300 employees and 18.9% of the commercial banks in Kenya have 151 to 200 employees. 13.5% of the commercial banks in Kenya have 100 to 150 employees whereas 5.5% have less than 100 employees. This implies that most of the commercial banks in Kenya are large enough and therefore they are in a position to give the required information.

4.2.9 Asset Base of the Bank

The study also sought to establish the asset base of each commercial bank. The respondents were requested to indicate the number of branches their bank has. Table 4.8 shows the results.

Table 4.9: Asset base of the Bank

Asset Base (ksh. Billions)	Frequency	Percentage
Below 10	3	8.1
10-50	9	24.3
50-100	12	34.5
100-200	7	18.9
Above 200	6	16.2
Total	**37**	**100.0**

From the table 4.8 above, the study established that 34.5% of the commercial banks in Kenya have asset base of 50 to 100 billion, 24.3% of commercial banks in Kenya have asset base of 10 to 50 billion, 18.9% of the commercial banks in Kenya have an asset of 100 to 200 billion, 16.2% of the commercial banks in Kenya have asset of above 200 billion whereas 8.1% have asset of less than 10 billion. This implies that most of the commercial banks in Kenya are large enough and have a large asset base, therefore they are in a position to give the required information.

4.2.10 Customers of the Bank

Table 4.9 below shows the customers of the different commercial banks in Kenya**.**

Table 4.10:Customers of the Bank.

Customers	Frequency	Percentage
Below 50,000	2	5.4
50,000-100,000	6	16.3
100,000-500,000	11	29.7
500k- 1 M	8	21.6
1M- 2M	5	13.5
Above 2M	5	13.5

Total	**37**	**100.0**

The study established that 29.7% of the commercial banks in Kenya have 100,000-500,000 customers, 21.6% of commercial banks in Kenya have 500K- 1M customers, 16.3% of the commercial banks in Kenya 50,000-100,000 customers, 13.5% of the commercial banks in Kenya have 1M- 2M and above 2M customers whereas 5.1% have customers below 50,000. This implies that most of the commercial banks in Kenya largely share their customers, therefore they have account in different several commercial banks and are in a position to give the required information.

4.3 Big Data Analytics

4.3.1 Commercial Bank Big Data Analytics initiatives

The study sought to find out to which extend the commercial banks in Kenya have big data analytics initiatives. The respondents were asked to indicate whether their commercial bank have big data analytics initiatives or no. Table 4.10 below represents the findings.

Table 4.11: Commercial Bank Big Data analytics initiatives

Response	Frequency	Percentage
Yes	33	89.2
No	4	10.8
Total	**37**	**100.0**

From the table 4.10 above, the study established that 89.2% of the commercial banks have big data analytic initiatives whereas only 10.8% doesn't have big data analytic initiatives.

4.3.2 Big Data Analytics adopted by Commercial

The study further sought to establish whether the commercial banks employed descriptive analytics, predictive analytics, prescriptive analytics and data mining as big data analytics technique. The table below show the findings;

Table 12: Data Analytics Technique

Technique	yes		No	
	Frequency	Percentage	Frequency	Percentage
Descriptive analytics	15	40.54	18	59.46
Predictive analytics	10	27.03	9	72.97
Prescriptive analytics	6	16.22	4	83.78
Data mining	6	16.22	6	83.78
Total	**37**	**100**	**37**	**100**

The study revealed that the 40.54% and 27.03% of the participants indicated that the commercial banks they worked for employed descriptive and predictive data analytics technique. However, only 16.22% indicated that their commercial banks employed prescriptive analytics and a similar percentage of the respondents also indicated that the commercial banks they worked for employed data mining to access data that they subject to various techniques of data analytics.

4.3.3 Technology for Data Analytics

The study further sought to determine which Big Data Analytics technologies and tools the commercial banks they worked in used for data analytics. The results are shown in the table below.

Table 13: Technology for Data Analytics

Technology	Frequency	Percentage
Hadoop	7	18.92
Mapreduce	5	13.51
NoSQL	24	64.86
Total	**37**	**100.0**

The results indicate that there are only three predominant technology used by commercial banks. NoSQL was the most used technology as 64.86% of the respondents indicated to have applied the technology. However, 18.92% and 13.51% of the respondents indicated that they had employed Hadoop and Mapreduce respectively.

4.3.4 Big Data Analytics

The respondents were asked to rate the statement in table 4.12 about big data analytics usage in commercial banks using a scale of 1-5, where 1-No Extent, 2-Little Extent, 3-Moderate Extent, 4-Large Extent, 5-Very Large Extent. The average mean and standard deviations are shown in Table 4.11 below.

Table 4.14:Big Data Analytics

Big Data Analytics	Mean	Std. deviation
Using descriptive analytics to analyze historical data	4.02	0.74
Using predictive analytics to forecast future probabilities	4.15	0.84
Predictive analytics is used to predict trends	4.20	0.75
Prescriptive analytics is used to determine best outcomes of events	3.89	0.69
Prescriptive analytics is used in mitigating against risks	4.03	0.87
Using prescriptive analytics to support decision making	4.11	0.53
Data mining is applied in sorting large sets of data	3.98	0.72
Data mining is used to predict future trends in your organization	3.96	0.83
Data mining is being used in identifying patterns and establishing relationships in data and giving insights on appropriate decisions to be taken	4.15	0.66
Others (Please specify)	3.87	0.88

From the finding most of the respondents agreed that; Big data analytics is being used in their organization It depicted that, using descriptive analytics to analyze historical data (M=4.02, SD=0.74), Using predictive analytics to forecast future probabilities (M=4.15, SD=0.84), Predictive analytics is used to predict trends (M=4.20, SD=0.75). Further majority of the respondents agreed that; Prescriptive analytics is used to determine best outcomes of events (M=3.89, SD=0.69 Prescriptive analytics is used in mitigating against risks (M=4.03, SD=0.87) Using prescriptive analytics to support decision making (M=4.11, SD=0.53), Data mining is applied in sorting large sets of data(M=3.98, SD=0.72), Data mining is used to predict future trends in your organization(M=3.96, SD=0.83), Data mining is being used in identifying patterns and establishing relationships in data and giving insights on appropriate decisions to be taken(M=4.15, SD=0.66, Others (Please specify) (M=3.87, SD=0.88). This study is in line (Russom, 2011).

4.4 Benefits Banks Get from using Big Data Analytics

The study also sought to determine the extent to which commercial banks have benefited from using big data analytics. A scale of 1-5 was used where, 1) – No Extent, (2) – Little Extent, (3) – Moderate Extent, (4) – Large Extent, (5) – Very Large Extent. Table 4.12 below represents the findings.

Table 4.15: Benefits Banks Get from using Big Data Analytics

Benefits	Mean	Std. deviation
Big data analytics has resulted in new revenue opportunities	4.00	0.56
Use of big data analytics has enhanced marketing strategies	4.03	0.46
Big data analytics has resulted in improved customer service	3.98	0.71
There has been improved operational efficiency using big data analytics	4.11	0.94
Use of big data analytics has resulted in customer retention	3.78	0.67
Use of big data analytics has helped acquire new customers	4.61	0.53
Big data analytics has improved risk management initiatives	4.33	0.29
Big data analytics has helped our bank gain competitive advantage	4.02	0.32
Big data analytics has resulted in improved decision making	3.67	0.67
Specify Others	4.21	0.18

From the finding, majority of the respondents agreed that; big data analytics is beneficial to commercial banks in Kenya depicting (M=4.00, SD=0.56) in new revenue opportunities; Use of big data analytics has enhanced marketing strategies (M=4.03, SD=0.46); Big data analytics has resulted in improved customer service (M=3.98, SD=0.71); There has been improved operational efficiency using big data analytics (M=4.11, SD=0.94). Further the respondents agreed that use of big data analytics has resulted in customer retention (M=3.78, SD=0.67) and Use of big data

analytics has helped acquire new customers (M=4.61, SD=0.53); Big data analytics has improved risk management initiatives (M=4.33, SD=0.29); Big data analytics has helped our bank gain competitive advantage (M=4.02, SD=0.32); Big data analytics has resulted in improved decision making (M=3.67, SD=0.67) and other benefits (M=4.21, SD=0.18).

4.5 Challenges Banks Face using Big Data Analytics.

The study also sought to determine the extent to which commercial banks have challenges from using big data analytics. A scale of 1-5 was used where, 1) – No Extent, (2) – Little Extent, (3) – Moderate Extent, (4) – Large Extent, (5) – Very Large Extent. Table 4.16 below represents the findings.

Table 4.16: Challenges Banks Face using Big Data Analytics.

Challenges Banks Face using Big Data Analytics.	Mean	Std. deviation
Customer privacy concerns are impacting the big data analytics efforts	4.15	0.55
Regulatory restrictions in cross boarder transfer of data	4.20	0.48
Poor quality of data is hampering efforts	3.69	0.84
Security of information collected about customers/individuals	4.13	0.72
High volume of data scattered in silos across units is difficult to manage	3.98	0.52
Lack of skilled personnel to effectively harness big data capabilities	4.07	0.36
Lack of sponsorship and support from top executives	3.89	0.28
Dependency on legacy systems for data processing	4.02	0.64
Ineffective processes for governing big data	4.10	0.73
The high cost of acquiring data technology	3.88	0.49
Specify others	4.30	0.38

From the finding in table 4.16 above, majority of the respondents agreed that; commercial banks in Kenya face challenges in using big data analytics where Customer privacy concerns are impacting the big data analytics efforts (M=4.15, SD=0.55); Regulatory restrictions in cross boarder transfer of data

(M=4.20, SD=0.48 Poor quality of data is hampering efforts (M=3.69, SD=0.84); Security of information collected about customers/individuals (M=4.13, SD=0.72). Further the respondents agreed that high volume of data scattered in silos across units is difficult to manage (M=3.98, SD=0.52) and there is lack of skilled personnel to effectively harness big data capabilities (M=4.07, SD=0.36); Dependency on legacy systems for data processing (M=4.02, SD=0.64); Lack of sponsorship and support from top executives (M=3.89, SD=0.28); Ineffective processes for governing big data (M=4.10, SD=0.73); High cost of acquiring data technology (M=3.88, SD=0.49) and

other challenges (M=4.30, SD=0.38). This finding is in line with (Gordon, 2007) that among other many challenges.

4.6 Regression Analysis

A regression analysis was applied find out the influence of big data and analytics on the competitive advantage of commercial banks in Kenya. The independent variables were measured in terms of Data Analytics Use and Characteristics of the bank. The results are discussed in table 4.14, 4.15 1nd 4.16.

Table 4.17: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.843[a]	0.711	0.702	0.001

From the regression summary, The R value was 0.843 indicating that there is a very strong positive relationship between the independent variables and Competitive advantage. The R squared (R^2) value of 0.711 shows that 71.1% of the competitive advantage is explained by the big data analytics. The remaining 28.9% is explained by other factors put in place in order to enhance competitive advantage.

Table 4.18: Anova a

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	63.74	2	31.87	11.14	.001[a]
Residual	97.27	34	2.861		
Total	161.01	36			

The ANOVA results in table 4.16 show F-value of 11.14, which is significant at 0.001[a]<0.05. This signifies a model fit. It also implies a match between the regression model and the data. This means that the use of regression analysis was justified.

Regression coefficients are presented in table 4.17. All the coefficients of the two study variables or attributes were statistically significant at $p<0.05$.

Table 4.19: Regression Coefficients Table

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.172	.071		2.422	.001
	Data Analytics Use	.356	.014	.342	25.42	.002
	Characteristics of the bank	.244	.019	.231	12.84	.000
a. Dependent Variable: Competitive advantage						

The established regression equation was: $\mathbf{Y = 0.172 + 0.356X_1 + 0.244X_2}$ where X_1 is Data Analytics Use, X_2 is Characteristics of the bank and Y is Competitive advantage. This means that use of data analytics increases Competitive advantage by 35.6%. On the other hand, a unit increase to better Characteristics of a commercial bank leads to an increase of Competitive advantage (B= 0.244, p=.000).

The study also established a significant relationship between Competitive advantage and the independent variables; Data Analytics Use ($p=0.002<0.05$) and Characteristics of the bank ($p=0.000<0.05$). Competitive advantage. These findings were consistent with that of (Davenport, 2013) who noted that adoption of big data analytics in a company makes it compete better in the market.

4.7 Discussion of the finding

The study determined that commercial banks use descriptive analytics to analyze historical data, predictive analytics to forecast future probabilities and Predictive analytics to predict trends. Further it was established that; Prescriptive analytics is used to determine best outcomes of events, Prescriptive analytics is used in mitigating

against risks, prescriptive analytics to support decision making and that data mining is applied in sorting large sets of data. Data mining is used to predict future trends in your organization, identifying patterns and establishing relationships in data and giving insights on appropriate decisions to be taken.

Further, the results from the regression model indicated that use of big data analytics increase the competitive advantage of commercial banks. it further established that holding all other factors constant, a unit increase to better Characteristics of a commercial bank leads to an increase of Competitive advantage of the commercial bank hence attaining a competitive edge over its competitors. This is supported by (Davenport, 2013) findings who noted that adoption of big data analytics in a company makes it compete better in the market.

In addition, the study found out that new revenue opportunities, improved decision making, improved risk management initiatives, customer retention, improved operational efficiency in commercial banks were as a result of using big data analytics. Further, the study determined that commercial banks faced several shortcomings while using big data analytics. Unfavorable government restrictions in cross boarder transfer of data, Poor quality of data is hampering efforts, High volume of data scattered in silos, Lack of skilled personnel, Lack of sponsorship and support from top executives, Ineffective processes for governing big data, the high cost of acquiring data technology poses a big challenge adoption and use of big data analytics in commercial banks in Kenya. This finding agrees with (Michaelides, 2015) who pointed out that it is difficult and challenging to use big data analytics where there are no skilled personnel, recent technology and systems and support from the top level management.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary, conclusions, and recommendations of the study.

5.2 Summary of findings

The study aimed at discussing the role of electoral management bodies in enhancing democracy in Africa – a comparative study between national electoral commission (Tanzania) and the independent electoral and boundaries commission of kenya-2005-2015. The research findings showed that facilitating voter to register and checking voters roll regularly, managing and overlooking the dealing of political parties, responding to complaints arising from elections, training and educating voters, enforcing adherence to legislation provisions, rules, guidelines and regulations, registration of candidates is *the mandate of EMBs*with a large asset base coupled with the long years of operation of the banks needed to enhance the reliability of the information provided.

The study established that most of the commercial banks have big data analytics initiatives. The commercial banks used descriptive analytics technique to analyze historical data, predictive analytics to forecast future probabilities and predict trends, prescriptive analytics in mitigating against risks and to support decision making. The study also noted that commercial banks use data mining to sort large sets of data, identify patterns and establish relationships in data and giving insights on appropriate decisions to be taken and lead to competitive advantage of the commercial banks.

Further the study revealed that use of big data analytics by commercial banks in Kenya results in new revenue opportunities, enhanced marketing strategies and

improved customer service. The study also revealed that use of big data analytics by commercial banks lead to improved operational efficiency, customer retention, acquiring new customers, improved risk management initiatives, helped bank gain competitive advantage and improved decision making.

The study also established that commercial banks in Kenya face challenges in using big data analytics due to customers privacy, regulatory restrictions in cross boarder transfer of data, poor quality of data is hampering efforts and security of information collected about individuals/ customers. It further established that high volume of data scattered in silos across units is difficult to manage, there is lack of skilled personnel to effectively harness big data capabilities and lack of sponsorship and support from top executives. The study also noted that there is dependency on legacy systems for data processing, ineffective processes for governing big data and high cost of acquiring data technology.

5.3 Conclusion

This study has provided a comprehensive review of big data analytics and competitive advantage of the commercial banks in Kenya. Based on the findings of this study, the study concluded that commercial banks use big data analytics. They emphasis on the many benefits the commercial banks get from using big data analytics and lead to competitive aggressive to achieve entry and improve position. Customer satisfaction, creating new customers as well as customer retention and help in independent decision making are key benefits for commercial banks using big data analytics.

Further the study concludes that commercial banks are faced by a number of challenges in using big data analytics such as dependency on legacy systems for data processing, ineffective processes for governing big data and high cost of acquiring data technology.

Lastly the study concludes that there is a significance relationship between commercial banks using big data analytics and competitive advantage of the commercial banks.

5.4 Policy Recommendations

This study recommends that for commercial banks in Kenya to be competitive, they need to re-evaluate their capabilities. Benchmarking should be used to borrow best practices on the best data analytic techniques to cut cost and improve on other capabilities. Moreover, more funds should be sourced in order to acquire the best data technology at the same time thus employing other models of competitive priorities. This could be done by outsourcing the best systems as well as creating partnerships with the best data technologists.

Further the study recommends the commercial banks should hire competent employees and explore new innovations so as to enhance quality of data hampering and establish good data management procedures.

5.5 Limitations of the Study

This research shows the effect of implementing the BYOD strategy in a company in order to intensify the work engagement of the employees. Work engagement is considered as one of the main elements that employers consider since it is connected to employee satisfaction and good performance in several studies that have been done. Findings from this research show that BYOD has a positive effect on work engagement, specifically at Equity Bank Limited. BYOD is considered responsible for elaborating fifteen percent plus of variation concerning work engagement and thus should be categorized as one element that affects work engagement.

During the study the researcher traveled for long distances before accessing different commercial banks to access the respondents. In addition, some of the respondents had to be pushed to assist with data while others declined entirely to respond to the questionnaires. Many follow up calls had to be made to remind them. Time allocated for the study was insufficient. The resources available to the researcher were also limited.

5.6 Recommendation for Further Research

From this study, the following directions for future research in commercial banks in Kenya were recommended: The commercial banks in Kenya. So, generalizations cannot adequately be relied upon based on their geographical locations and markets they serve. Founded on this fact among others, it is so recommended that a narrow-based study should be done for instance commercial banks in Nairobi. Similar surveys to this can be redone in a few years to come to asses if the factors have changed as more commercial banks are established in Kenya.

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APPENDICES

Appendix I: Research Questionnaire

This questionnaire is intended to assist conduct a study on Big Data Analytics and the Competitive Advantage of Commercial Banks in Kenya. Your bank has been nominated to take part in the study. Your help is being sought to participate in this exercise by completing this questionnaire frankly and to the best of your knowledge. Rest assured that information provided in this questionnaire is strictly for academic purposes and would be treated as confidential.

Thank you.

SECTION A: PERSONAL & ORGANIZATIONAL DETAILS

1. Indicate Name of your Bank_____

2. Gender: Male ☐ Female ☐

3. Age: ☐ 20-30 ☐ 30-40 ☐

   40-50 ☐ 50+ ☐

4. Level of Education

   Diploma ☐

   Degree ☐

   Masters Degree ☐

   PhD ☐

5. What department do you work in_____?

6. How many years has your bank been in operation_____?

7. How many branches does your bank have_____?
8. Is your bank a local or foreign bank_____?
9. How many employees are in your bank _____?

10. What is the asset base of your bank? (In Ksh. Billions)

Below 10 ☐

10-50 ☐

50-100 ☐

100-200 ☐

Above 200 ☐

11. How many Customers does your bank have?

Below 50,000 ☐ 50-100,000 ☐

100,000-500,000 ☐ 500K-1M ☐

1M-2M ☐ Above 2M ☐

SECTION B: THE EXTENT TO WHICH YOUR BANK IS USING BIG DATA ANALYTICS

12. Does your organization have big data analytics initiatives?

Yes ( ) No ( )

13. Does your organization perform the following big data analysis techniques? (Please mark Yes or No)

    Descriptive analytics Yes ( ) No ( )

    Predictive analytics Yes ( ) No ( )

    Prescriptive analytics Yes ( ) No ( )

    Data mining Yes ( ) No ( )

    Others (Specify) _____

14. Indicate the Big Data Analytics technologies and tools your organization uses below

Hadoop		Hive	
Kafka		NoSQL	
Hbase		Mapreduce	
Pig		YARN	
Spark			

Others_____

15. Please indicate below the extent to which big data analytics is being used in your organization on a scale of 1-5. **1-No Extent, 2-Little Extent, 3-Moderate Extent, 4-Large Extent, 5-Very Large Extent.** Tick where appropriate.

	1	**2**	**3**	**4**	**5**
1. Using descriptive analytics to analyze historical data					
2. Using predictive analytics to forecast future probabilities					
3. Predictive analytics is used to predict trends					
4. Prescriptive analytics is used to determine best outcomes of events					
5. Prescriptive analytics is used in mitigating against risks					
6. Using prescriptive analytics to support decision making					
7. Data mining is applied in sorting large sets of data					
8. Data mining is used to predict future trends in your organization					
9. Data mining is being used in identifying patterns and establishing relationships in data and giving insights on appropriate					

decisions to be taken					
10. Others (Please specify)					

SECTION C: BENEFITS BANKS GET FROM USING BIG DATA ANALYTICS

16. Please indicate below to what extent your organization has benefited from using big data analytics. 1) – **No Extent**, (2) – **Little Extent**, (3) – M**oderate Extent**, (4) – **Large Extent**, (5) – **Very Large Extent**

	1	2	3	4	5
1. Big data analytics has resulted in new revenue opportunities					
2. Use of big data analytics has enhanced marketing strategies					
3. Big data analytics has resulted in improved customer					

service					
4. There has been improved operational efficiency using big data analytics					
5. Use of big data analytics has resulted in customer retention					
6. Use of big data analytics has helped acquire new customers					
7. Big data analytics has improved risk management initiatives					
8. Big data analytics has helped our bank					

gain competitive advantage					
9. Big data analytics has resulted in improved decision making					
10. Specify Others					

SECTION D: CHALLENGES BANKS FACE USING BIG DATA ANALYTICS

17. Please indicate the extent to which the below challenges affect the implementation of big data analytics in your organization. (1) – **No Extent**, (2) – **Little Extent**, (3) – M**oderate Extent**, (4) – **Large Extent**, (5) – **Very Large Extent**

	1	2	3	4	5
1. Customer privacy concerns are impacting the big data analytics efforts					
2. Regulatory restrictions in cross boarder transfer of data					

3. Poor quality of data is hampering efforts					
4. Security of information collected about customers/individuals					
5. High volume of data scattered in silos across units is difficult to manage					
6. Lack of skilled personnel to effectively harness big data capabilities					
7. Lack of sponsorship and support from top executives					
8. Dependency on legacy systems for data processing					
9. Ineffective processes for governing big data					
10. The high cost of acquiring big data technology					
11. Specify others					

SECTION E: BIG DATA ANALYTICS & COMPETITIVE ADVANTAGE

18. How many new customers has your bank acquired in the last six months_____?
19. How many customers have taken up new products or services offered by your bank the in the last six months_____?
20. How many customers have left your bank in the last six months_____?
21. Has the number of customer complaints increased in the last six months?

    Yes ☐ No ☐
22. How many fraud incidences have been reported in the last six months_____?
23. How much loss has your bank incurred in the last six months as a result of operational risk_____?
24. Please comment on Big Data Analytics and the impact it has on the competitiveness of your bank.

    ._____

    _____

    _____

    _____

    _____

Appendix II: List of Commercial Banks in Kenya

1. ABC Bank (Kenya)
2. Bank of Africa
3. Bank of Baroda
4. Bank of India
5. Barclays Bank of Kenya[
6. Chase Bank Kenya (In Receivership)
7. Citibank
8. Commercial Bank of Africa
9. Consolidated Bank of Kenya
10. Cooperative Bank of Kenya
11. Credit Bank
12. Development Bank of Kenya
13. Diamond Trust Bank
14. Dubai Islamic Bank
15. Ecobank Kenya
16. Equity Bank
17. Family Bank
18. Fidelity Commercial Bank Limited
19. First Community Bank
20. Giro Commercial Bank
21. Guaranty Trust Bank Kenya
22. Guardian Bank
23. Gulf African Bank
24. Habib Bank
25. Habib Bank AG Zurich

26. Housing Finance Company of Kenya
27. I&M Bank
28. Imperial Bank Kenya (In receivership)
29. Jamii Bora Bank
30. Kenya Commercial Bank
31. Middle East Bank Kenya
32. National Bank of Kenya
33. NIC Bank
34. Oriental Commercial Bank
35. Paramount Universal Bank
36. Prime Bank (Kenya)
37. Sidian Bank
38. Spire Bank
39. Stanbic Bank Kenya
40. Standard Chartered Kenya
41. Trans National Bank Kenya
42. United Bank for Africa
43. Victoria Commercial Bank