BUSINESS INTELLIGENCE SYSTEMS AND CUSTOMER RELATIONSHIP MANAGEMENT IN MOBILE TELECOMMUNICATIONS FIRMS IN KENYA

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DECLARATION

This is my original work and it has not been presented in any other university for an award of a degree in any university.

Signed:……………………………. Date………………………………………

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D61/71213/2014

Supervisor's Declaration

The project has been approved with my authority as University supervisor

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DEDICATION

This project is dedicated to my dear parents, my siblings and their families, my husband and my children who gave me moral support and encouragement when I was pursuing my studies

ABSTRACT

Telecommunication industry especially mobile Telecommunication firms have been forced to devise ways to cope with competition. Managing customer relationships is one of the ways which is considered competitive by Telecommunications firms through use of available communication channels such as the use of email, website and text messages to share important information with the customers. This study was set out to ;-determine the extent to which Telecommunication firms are using business intelligence systems, determine the benefits that Telecommunication firms get from using business intelligence systems, establish the challenges that Telecommunication firms face when using business intelligence systems and establish the relationship between business intelligence systems and customer relationship management in Telecommunication firms in Kenya. The study used a census survey. The choice of this design was because the population is small and thus the researcher can easily study all the three Mobile telecommunication firms in Kenya. The population for this study consisted of the three telecommunications firms in Kenya that are licensed to work and operate in Kenya. They included: Safaricom Limited, Airtel Kenya and Orange. The sample size was 36 respondents who worked in business intelligence departments. Primary sources of data were collected with the help of unstructured questionnaires. The data collected was sorted, cleaned and coded before analysis. Data analysis was done using a regression model for objective one and descriptive statistics for objective two. Analyzed data was presented in tables and charts. A regression model was used to establish the relationship between business intelligence system and customer relationship management of Telecommunications firms in Kenya. The study found that the most popular business intelligence systems included: data mining, extract transform load tools, data warehouses and on-line analytical

processing tools. Mobile Telecommunication firms benefitted from using business intelligence systems through quick flow of information, faster responses and saved time and labour to a great extent. These firms faced challenges in the implementation of business intelligence systems which included lack of clear business intelligence standards, poor technical expertise, lack of support from users of the system, inadequate funding by sponsors, poor sensitization and lack of good user interface to interact with business intelligence systems. The regression results found that on-line analytical processing tools and data mining were positively related to customer service management. The findings further revealed that extract transform load tools and on-line analytical tools were statistically significant in explaining the influence of business intelligence systems on customer service management. Mobile Telecommunication firms should invest more in modern technologies and innovation. This is important in ensuring that firms have access to customer information which is important in decision making and tailoring products and services to match the growing needs of their customers. The major limitation faced by the researcher was time and cost constraints. Collecting primary data consumes a lot of time and resources. The researcher had to make relevant preparations in order to effectively manage different demands of the processes and at the same time manage time effectively. Future researchers should investigate the influence of factors such as government regulations and industry policies on business intelligence systems or other factors either as independent or moderating variables that can influence the decision of Mobile Telecommunication firms when making a decision on the kind of business intelligence system that a firm should adopt.

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LIST OF ABBREVIATIONS AND ACRONYMS

CA   Communications Authority of Kenya

CRM   Customer Relationship Management

ERP   Enterprise Resources Planning

KPTC   Kenya Posts and Telecommunications Corporation

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In the world of business, competition has intensified and knowledge as a source of business success in the market has become a critical strategic choice. Information has become as essential resource and a central business function of the organization that play an important role in the virtual market. The challenge to find information has been replaced by the problem of its proper use and whether the information is of good quality, reliable to provide high-quality knowledge. Volume of information has increased as a result of access to a lot of information; this makes it difficult to select important information (Ponomarjovs, 2013).

There are various competing and contradictory sources of information that makes its processing more difficult. In accordance to Tanev & Bailetti (2008) information is valuable when it is in small quantities; large amounts of information might divert the meaning due to ambiguity. This makes it difficult to make a rational decision as a result of high volume of redundant and erroneous information. How to obtain information is however critical for the organization and thus the role of business intelligence is essential because it assists in the acquisition of knowledge on the factors that affect the operations of the organization (Ranjan, 2010).

Business intelligence provides the organization with specific knowledge to identify the potential of the market and to direct their vision, goals and strategies. This helps the firm to allocate and productive use of available resources. Successful implementation of business intelligence requires constant communication through all channels of interaction with the customers such as internet and email. This is a way of managing relationships with the customers to realize their satisfaction. Prescott & Bhardwaj (2009) insist that the future of organizations will depend on the ability of

individuals, teams and the entire organization to continuously learn and enhance their knowledge and innovation. This cannot be achieved without use of modern business information systems especially the concept of Business Intelligence (BI), information and communication technologies and electronic networks. These components are essential in building a "learning organization" that can deal with global competition with the use of BI application as a strategic advantage (Tanev & Bailetti, 2008).

1.1.1 Business Intelligence Systems

Business intelligence systems can be defined as a set of tools, technologies and products that are programmed that are used to collect, integrate, aggregate and ensure data availability (Koronios &Yeoh, 2009). Business Intelligence Systems (BIS) consist of both operational data and analytical tools to present intricate and competitive data to planners and decision makers. This is intended to enhance the timeliness and the quality of the decision-making process (Negash, 2004). Business intelligence systems provide actionable information that is delivered at the right time when decisions are made (Negash, 2004). The business techniques are grouped into three ways namely business intelligence tools these are reporting tools that read data, process them, and format data into structured reports which are delivered to users. These tools are used primarily for assessment. Data mining tools are utilized for processing data with the help of statistical techniques. They are applied to establish patterns and relationships and projections based on the results. Knowledge management tools are used to store employee knowledge and make it accessible for interested parties. Knowledge management tools are unique from other set of tools because the source of data used is human knowledge. The most common components of a Business Intelligence Systems are data warehouse, ETL tools, OLAP techniques and data mining (Olszak & Ziemba, 2006).

The benefits of business intelligence systems are as follows; enables data collection from the organization, analysis of that data, preparation of all the necessary reports and conversing with all the users who are most needed. This allows end-users to have access on the subject of interest to conduct business activities (Nemati, 2005). This approach hinders redundant information from overloading the firm which could expose it to incorrect decisions (Prescott & Bhardwaj, 2009).

Business intelligence applications enhance the speed of making business decisions with regard to quality of data which is located in one central place, such as Data Warehouse. The challenges facing implementation of business intelligence systems is that most of these business intelligence systems are expensive to install. Secondly, employees lack adequate skills to operate business intelligence systems. Thirdly, firms fail to involve the end-users (customers) of BIS in designing and implementation of these systems to understand their needs, this impact negatively on the implementation of these systems (Greenberg, 2001).

1.1.2 Customer Relationship Management

According to Greenberg (2001) Customer Relationship Management (CRM) is an approach of managing the organization's interaction with its current and future customers. Nelson & Kirkby (2006) put more emphasis that customer relationship management tries to analyze data on the customer's history with the organizations with an objective of improving business relationships with the customers, retaining them and to drive sales growth. An important aspect of the Customer Relationship Management (CRM) approach is the CRM systems that gather data from a wide range of communication channels which includes a company's website, telephone, email, live chat and social media among others. Through the use of CRM approach and the

systems used to facilitate CRM, businesses can learn more about their target customers and appropriate ways to meet their needs (Wehrmann, 2006).

Customer Relationship Management is a strategy for managing the organizational relationships and interactions with the existing customers and potential customers. It assists the organization to access customer information and streamline processes and hence boost the firm's profitability. According to Kak (2008) a CRM system is a tool that helps in sales management, contacts management and improved productivity. CRM allows the organizations to focus on its relationships with the customers and other stakeholders of the organizations such as the suppliers. Organizations are currently looking for ways to personalize online experiences (mass customization) through utilization of tools such as help-desk software, email organizers and other types of enterprise applications. This is aimed at helping the organization to better understand their customers, their buying behavior and trends.

1.1.3 Telecommunications Firms in Kenya

Before Telecommunications services were controlled by the East African Community until 1977 when the Kenya Posts and Telecommunications Corporation (KP & TC) commenced its operations. This hindered moving from a monopolized structure to a more liberal market structure of communication. KP & TC was disbanded in 1999 to provide an opportunity for reforms and fair competition in the Telecommunications industry in Kenya (Hequan, 2009).

Apparently, these reforms have led to supervision by the Public and Communication Authority of Kenya. Although the Telecommunication industry has grown rapidly following its liberalization, a lot still needs to be done to realize its vision, uphold the provisions of the statute and policy implementation. This is because its policy statement fails to define the time frame for which the changes should be implemented.

Further, there lacks clarity on the progress towards privatization of the Telecom industry however, there are fundamental reforms in the Telecommunications sector with major players such as Safaricom Limited, Airtel Kenya and Orange (Omae, Langat & Ndung'u, 2015).

Communications Authority of Kenya (CA) has licensed 4 mobile operators over the last 15 years. These include: Safaricom Limited, Airtel Kenya and Essar (Yu);(all of them being global operators) and some internet services providers like Wananchi and Jamii Telkom. The study will focus on the three mobile telecommunication firms these include Safaricom Limited, Airtel Kenya and Orange Kenya. The choice of the 3 mobile telecommunication firms is because of the uniqueness of their products and customer service management strategies (Omae & Ndung'u, 2015).

Use of mobile phones has created a need for customer information to make decisions, competitors' analysis, establishing market trends and making prediction. Business intelligence systems are components that process, store and provide useful information to users for planning and decision making. This enables the firm to offer quality products and services that meet the changing customer needs (Magua, 2013).

1.2 Research Problem

Customers are perceived as key stakeholders for the success of the business. Fletcher (2008) posits that personalization of the relationship between the customers and the firm provides a better understanding of the customers and ways to respond to their needs. Reynolds (2005) posits that business intelligence systems are tools that are utilized to present complex data concerning customers for decision-making. This ensures that customer needs are met. However, Olszak & Ziemba (2006) insist that business intelligence systems minimize communication costs and improve organizational performance.

Telecommunication industry, mobile Telecommunication firms have been forced to devise ways to cope with competition. Managing customer relationships is one of the ways which is considered competitive by Telecommunications firms through use of available communication channels such as the use of email, website and text messages to share important information with the customers. Nevertheless, Magua (2013) argues that performance is the major drive why organizations opt to establish relationships with their customers.

Organizations have realized the worth of establishing relationships with their customers as a way of retaining them and attracting new customers. Researchers Hannula & Pirttimaki (2003) studied the influence of business intelligence on performance. The study found that business intelligence enhanced communication between the firm and the customers in 50 service firms in America. This attracted more customers' leading to a growth in sales and hence improved organizational performance. Kak (2008) examined the link between business intelligence and customer loyalty of Australian banks. A positive relationship between business intelligence and customer loyalty was found to exist. Moldovan (2011) found that the major challenges that faced implementation of BIS in manufacturing firms in Europe were lack of top management support and resistance to change.

In Kenya, Wachira (2009) studied business intelligence in the insurance companies; the results showed that business intelligence was used as a tool to gain competitive advantage by gathering customer information. Kamau (2010) assessed the challenges facing implementation of business intelligence systems. The study found that lack of adequate capital and inadequate skills and knowledge were the key impediments in

the implementation of BIS. Wesonga (2013) examined the use of business intelligence practices by Old Mutual Kenya. It was found that business intelligence had a positive relationship with organizational performance. Mukuche (2015) carried out a study on business intelligence and competitiveness of insurance companies in Kenya. The results found that business intelligence was used as a tool for competitiveness.

Referring to the above studies, inexhaustive focus has been made on the influence of business intelligence on the customer relationship management of mobile Telecommunication firms in Kenya. This study therefore sought to bridge this gap by finding answers to the questions: What is the extent to which Telecommunication firms are using business intelligence systems? What are benefits that Telecommunication firms get from using business intelligence systems? What are the challenges that Telecommunication firms face when using business intelligence systems? and what is the relationship between business intelligence systems and customer relationship management in Telecommunication firms in Kenya?

1.3 Research Objectives
The objectives of the study were to:-

i. Determine the extent to which Telecommunication firms are using business intelligence systems.

ii. Determine the benefits that Telecommunication firms get from using business intelligence systems.

iii. Establish the challenges that Telecommunication firms face when using business intelligence systems.

iv. Establish the relationship between business intelligence systems and customer relationship management in Telecommunication firms in Kenya.

1.4 Value of the Study

The study will be constructive to mobile Telecommunication firms in Kenya on the significance of business intelligence in managing their relationships with the customers. Telecommunication firms will understand how business intelligence can be utilized to improve customer satisfaction and loyalty.

The empirical findings of the study might be used by Communications Authority of Kenya,(CA) in policy formulation on the best policies that will enable Telecommunication firms to engage in fair competition and effective utilization of business intelligence to improve their relationship with the customers. Information Technology (IT) practitioners will gain more knowledge on the process of business intelligence to ensure that the information obtained is of high quality and reliable for decision-making and competitor analysis.

Researcher and academicians will increase their knowledge on business intelligence tools, its benefits and the challenges that the firm face in the implementation of business intelligence. The findings obtained in this study can be used as a reference point for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provides a discussion of the theoretical foundation, benefits of business intelligence systems, challenges of these systems, the link between business intelligence systems and customer service management, empirical studies, summary of the literature review and the conceptual framework.

2.2 Theoretical Framework

This study is informed by the following theories Technology Acceptance Model, Diffusion of Technology Theory and the Theory of constraints. The theoretical argument is integrated with the study variables, business intelligence systems and customer relationship management.

2.2.1 Technology Acceptance Model

This theory was advanced by Davis (1989) who showed the relationship between the user's acceptances of new information system and their perception of the ease of use and the significance of using information system. It consists of two beliefs. These are the perceived utilities and the perceived ease of application, and these two concepts determine the attitudes to adopt modern technology. These include the user's behaviour and their perception about the use of business intelligence systems.

Kim, 2006; Alain and Martin (2009) posit that Technology Acceptance Model (TAM) holds that there are a myriad of factors that affect influence the decision by users on how and when they use information technology. TAM is aimed at determining the behaviors of users towards specific technologies by utilizing two factors namely perceived usefulness and perceived ease of use. The exponents of this theory have argued over two beliefs, which are the (perceived usefulness and perceived ease of use. Attitudes influence the intended use of business intelligence systems. In line with

this study, the use of business intelligence systems has an influence on the way in which the firm manages its customers. Perceived usefulness is the degree to which an organization thinks that the adoption of business intelligence system will impact positively on organizational performance. Perceived ease of use is the effort that is expected of the organization to implement business intelligence systems.

2.2.2 Diffusion of Technology Theory

This theory was set out by Rogers in 1986. This theory is often regarded as a valuable change model for guiding the technological innovation where the innovation is modified and presented in ways that seek to meet the needs of across all levels of adopters. The theory also stresses that significance of communication when an organization introduces modern technology (Stockdill & Morehouse, 2013).

Top management team should ensure adequate communication to the employees to ensure that they are informed about why the organization intends to introduce new technologies and how they will be affected by the new technologies. In line with this study, it is the role of the top management to communicate to the employees concerning any form of change that they might intend to introduce in the organization. This is aimed at achieving creating an enabling environment that will support the implementation of the information technology. This coincides with Oblinger & Maruyama (2010) who insisted on the significance of communication and peer networking with the adoption process.

North (1995) holds that the diffusion of innovation is the process that occurs as people adopt a new concept or practice. The process of introducing a new concept in the organization follows a series of steps which are not easy to achieve given the dynamics of the organizational operations and how well the organizations aligns itself to achieve this fundamental goal. It is therefore worthwhile for the organization to

make all the relevant preparations when introducing information technology to enhance its successful implementation. This coincides with Rogers (1997) who distinguished five categories of adopters of an innovation they include innovators, early adopters, early majority, late majority and laggards.

2.2.3 Knowledge-Based View

Alavi & Leidner (2001) posit that business intelligence system provides a platform for accessing important information for the organization. An organization seeks to have knowledge about its customers, employees, knowledge its suppliers and the right resources and facilities to effectively manage their customers. This theory considers several dimensions of development of this view namely, organizational learning, organizational capabilities and competencies (Ketchen & Hult, 2007).

Organizational learning is the ability of an organization to create, retain and transfer knowledge within an organization. Organizational capability refers to the ability of the firm to effectively management its customers to achieve competitiveness. The firm seeks to use customer information for decision-making, making prediction and competitor analysis. Organizational competencies involve having the right technology to assist in gathering high-valued information concerning the customers. Grant (2002) used knowledge-based view in gathering knowledge about customers. This was achieved through information sharing that enabled real-time sharing of information between the firm and the customers. Information is an intangible resource that is utilized for decision-making purposes and business intelligence systems are the most appropriate tools for collecting and analyzing customer information.

Knowledge is a strategic and significant resource of the firm. The proponents of this theory; Ketchen and Hult (2007) hold that knowledge-based resources are impossible to replicate and socially complex, heterogeneous knowledge bases and capabilities

that play a crucial role in making decisions and analyzing the customer behavior and market trends. This is consistent to Foss (2002) who explained that knowledge is a powerful resource in making strategic decisions in addressing specific needs of the customers. To get the right knowledge, the firm needs to invest in the right technology such as business intelligence systems to provide a platform where the firm can access important information about the customers.

2.2.4 Theory of Constraints

According to Goldratt (1990), the Theory of Constraints (TOC) is a methodology for identifying the most important limiting factor that is a constraint that inhibits or prevents an organization from achieving its set goals and objectives then systematically improving that constraint until it is no longer the limiting factor. In the public sector, the constraint is often referred to as a bottleneck. Theory of Constraints takes a scientific approach to improvement (Kendall, 1998). For example affordability and installation of business intelligence is a constraint to some of the mobile telecommunication firms. This kind of technology is expensive and hence its use by telecommunication firms is a constraint. This creates an impediment towards access to customer information.

An appealing trait of the theory of constraints is that it prioritizes improvement activities. The top priority is always the current constraint. In an environment where there exists an urgent need to respond to customer needs, TOC provides an approach for creating a rapid improvement (Goldratt, 2001). Successful implementation of the theory of constrains contributes to improved customer service management, this leads to improved quality of customer services, improved efficiency, improved customer trust and confidence and customer satisfaction. In this theory, every process has a single constraint right from the installation and then implementation of business

intelligence systems. Thus, the process can only be improved when the constraint is improved. Dettmer (1997) posits that an important corollary to this is that spending time optimizing non-constraints does not provide significant benefits; only improvement to the constraints will contribute towards successful implementation of business intelligence systems and contribute positive towards customer relationship management (Mabin & Balderstone, 1999).

2.3 The Concept of Business Intelligence Systems

Business intelligence systems comprise of the following components: data warehouses, Extract Transform Load tools (ETL), On-Line Analytical Processing (OLAP) techniques and data mining (Olszak & Ziemba, 2006). A data warehouse is collection of relevant information about the business, which is validated for analysis to support decision-making in business. Data warehouses are populated with data, which is extracted from various databases. Data warehouses are subject-oriented databases, which are integrated into the information system. This kind of data is relevant and hence the data stored in the database should be updated regularly to continuously meet the needs of the end-users of this information.

ETL are tools and processes that are used to extract data from one or many sources of systems to transform data from different formats into a universal format and then load the data into a data warehouse (Schink, 2009). ETL tools are tasked with extracting information that is deemed to be essential to the business. These tools are used to manipulate data and present it into information that can be used for managerial decision-making. ETL tools put more emphasis on the integration of data into data warehouse (Arnott et al., 2004).

 OLAP are tools that attempt to analyze complex data using real-time on a database that is consistently updated with transactional data. The OLAP searches huge data

files through automatic generation of SQL queries (Olszak & Ziemba, 2006). It enables the user to have access, analysis and modeling of business problems and sharing of data that is kept in the data warehouses (Olszak & Ziemba, 2007). This is also consistent with Olszak and Ziemba (2007) who argues that OLAP provide a variety of methods for analysis of data and drilling of data and the tools are mainly utilized for interactive report generations.

Data mining technique are designed to establish relationships and rules in a data warehouse and then create a report of these relationships and rules (Hevner & March, 2005). The process of data mining involves ascertaining the patterns, regularities and rules and generalizations of data resources. Knowledge from mining of data might be utilized to project an outcome of a decision or to describe a reality. The prediction that produced by data mining utilize variables to forecast the outcome of a situation which is determined by graphing, tabling and developing formulas in line with the available data (Olszak & Ziemba, 2007).

2.3.1 Benefits of Business Intelligence Systems

Fletcher (2008) opines that BIS technology allows the users to respond quickly and understand complex information to make better and faster decisions to realize business goals. BIS seeks to enhance efficiency and effectiveness of the organization. A few business intelligence solutions lead to a faster flow and access to information to the firm. Business intelligence system allows greater flexibility of users by developing reports, efficient access and a better overview of the data.

According to Greenberg (2001) business intelligence system is used to make informed business decisions and to enhance competitive advantage. This is most applicable especially in cases when firms extrapolate information from indicators in the external environment and make accurate prediction about trends in the future or economic

conditions. The aim of business intelligence is to improve the timeliness and the quality of information; this gives an indication of the best course of action (Chuah & Wong, 2013).

Use of business intelligence systems makes the firm to increase access to high-valued information that enables the firm to grasp and take advantage of opportunities. This information is essential in determining the weaknesses of the competitors and finding a solution to this problem. This enables the firm to meet unique and diverse needs of the customers and thus contribute positively to customer relationship management. Use of business intelligence systems increases accuracy in making predictions, this is because the firm can easily do an analysis and make projections. Business intelligence system allows information sharing and communication among departments. This improves coordination of activities and enables firms to respond quickly to changes in the financial status, customer preferences, and supply chain operations which lead to improved performance of the firm (Koronios & Yeoh, 2010).

Business intelligence systems provide an understanding of change in the behavior of customers and their spending patterns. Thus, the firm is able to project customer spending and to monitor their behavior and to be responsive about customer needs. This is consistent to Nemati (2005) who pointed out that business intelligence is utilized by firms to develop their ability to analyze the buying trends of the customers. This data is useful in developing products that meet the current consumption needs of the customers.

2.3.2 Challenges Facing Implementation of Business Intelligence Systems
There are various challenges faced by the firm in the implementation of business intelligence systems. The main challenge is the initial cost of installation and implementation. Wehrmann (2006) explains that business intelligence systems are

sophisticated systems that require a huge capital investment to install and implement. This might be quite expensive to most firms and hence prevent them from enjoying the benefits such integration which enables sharing of information with the customers (Hannula & Pirttimaki, 2003).

The other challenge is lack of technical skills and knowledge to implement and operate business intelligence systems. Firms outsource other firms to conduct implementation. This is expensive for the firm because its limits employees' exposure to new skills and knowledge. In most cases, only a few employees have the skills and knowledge concerning implementation of business intelligence systems and thus lack adequate time to train other employees to participate in the implementation. This causes delays, inconsistencies and inefficiencies thus impact negatively on the successful implementation of business intelligence systems (Reynolds, 2005).

Ranjan (2010) indicates that lack of top management support is a major hindrance towards the adoption and the use of business intelligence systems. This is a major contributor towards adequate access to customer information. Wehrmann (2006) argues that lack of top management support is a major impediment towards successful implementation of business intelligence systems. Top management lack corporate strategy to coordinate activities that will support implementation of business intelligence systems. Some top management executives lack managerial skills to manage change effectively and thus, they may not find the worth to implement business intelligence systems because of fear of the unknown in particular, the responsibilities that come with the new change. The other challenge is lack of end-user participation (Kak, 2008). Firms fail to involve the customers who are the end-users of business intelligence systems in the planning and implementation of business intelligence systems thus create a gap between the firm's expectations and the

customer needs hence making it difficult for the systems to serve the intended goal and thus impact negatively on the implementation of business intelligence systems (Williamson, 2010).

2.4 Business Intelligence Systems and Customer Relationship Management

According to Wehrmann (2006) business intelligence system allows business activities to be a two-way communication between the organizations and its customers. Communication is based on the interests between both sides; companies seek to achieve profits, survive and grow while clients want value addition in goods and services offered. Success companies are those that integrate their business processes with the expectations of the customers. This is consistent to Kak (2008) who argues that organizations that adopt modern technologies easily win customers since they can be able to provide products and services that meet the needs of the customers. Wehrmann (2006) found that business intelligence improves efficiency and operational performance, provides a platform where customers can share their experiences about the product and service offerings.

Hannula & Pirttimaki (2003) posit that adoption and use of modern technology improves mutual relations between the customers and the organization. This is because technology is a powerful medium of establishing better contacts between the company's personnel and the clients as well as efficient management of the organization. Moldovan (2011) indicates that the possibility of direct and targeted relationship between the organizations and the customers leads to personalization. This built and strengthens relationships between the organizations and the customers.

Ranjan (2010) contends that multi-channel form of communication provides for the establishment of more sophisticated and a two-way relationship making it more difficult to integrate data and create unique images of customers. Tanev & Bailetti

(2008) opine that organizations that fail to integrate customer information do not know their customers hence are unable to tailor customer products and services to their needs. This is consistent to a study by who indicated that most firms that met customers' satisfaction invested highly in integrated customer information systems which assisted them to gather information about the customer needs. Williamson (2010) insists that failure to integrate data between the firm and the customers might lead to customer dissatisfaction since the organization may not be able to meet customer expectations. This makes customers to feel ignored and irrelevant to the company. For this reason, it is important that information about the customers to be stored in one place and made available to everyone in the organization (Reynolds, 2005).

2.5 Summary

The study concludes that business intelligence systems are essential components that allow access to information which is utilized for decision making and analyzing the market trends. This kind of information is critical to the firm in devising approaches to retain existing customers and attracting new ones and hence contribute positively to improved firm performance. Business intelligence is used to make an analysis of the market while taking into consideration the changing needs of the customers.

The influence of business intelligence systems on customer relationship management has been supported by theories that guide this study which include technology acceptance model and diffusion of technology theory among others. The commonly used components of business intelligence systems include data warehouses, extract transform load tools, on-line analytical processing techniques and data mining. In line with the study objectives, it is expected that business intelligence will influence the t

customer relationship management. Therefore, the study has adopted a descriptive research design to establish this relationship.

2.6 Conceptual Framework

Figure 2.1 depicts the relationship that exists between business intelligence systems and customer relationship management. The independent variables include data warehouses, extract transform load tools, on-line analytical processing techniques and data mining. The dependent variable is customer relationship management. It is hypothesized that the independent variables influence the dependent variable. The intervening variables are top management support and organizational resources.

Independent Variables   **Dependent variable**

Business Intelligence Systems
- Data Warehouse Tools
- Online Analytical Processing
- Knowledge Management Tools
- Data mining tools

Customer Service Management
- Customer Satisfaction
- Customer loyalty
- Customer Retention

Top management support and organizational resources

Intervening variable
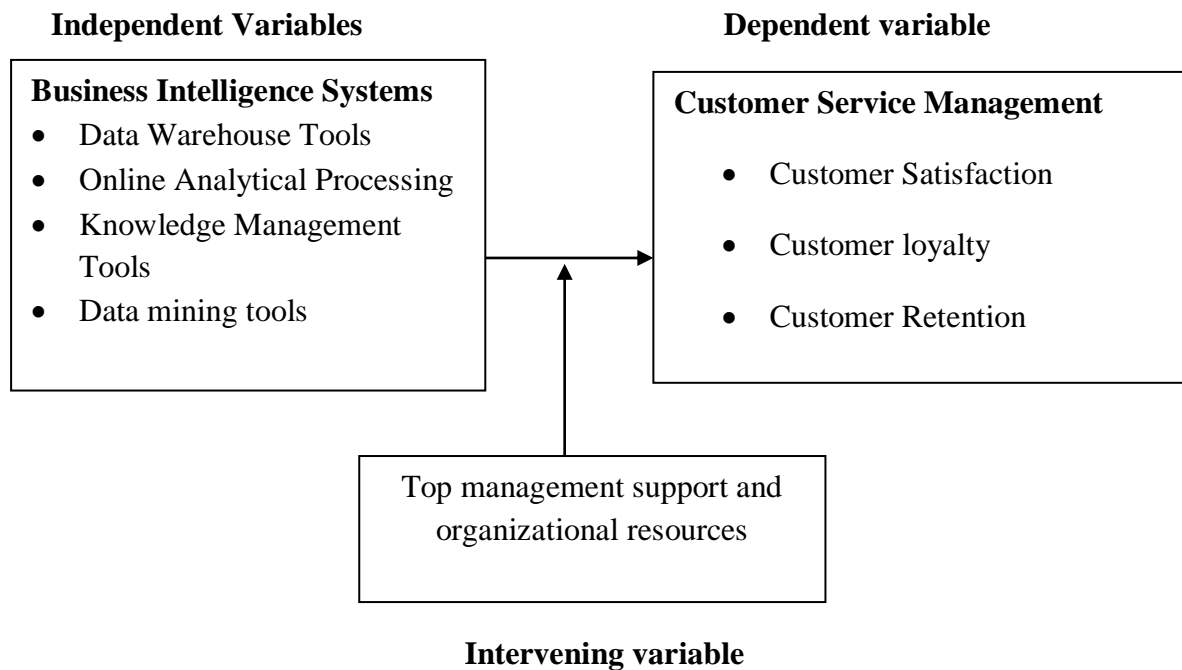
Source: Author, 2016

Figure 2.1 Conceptual Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research methodology that was used to achieve the objective for this study. It consists of the research design, the study population, data collection procedures and data analysis tools as follows:

3.2 Research Design

The study used a census survey. The choice of this design is because the population is small and thus the researcher can easily study all the three Mobile telecommunication firms in Kenya. Kothari (2006) explains that a census survey provides a full and clear picture of the firm's population and its traits at a particular point in time, which relates to the census. In a census study, data is gathered at a specific time from the entire population as compared to other survey techniques in which data is collected from only a small representation of the population then generalization is made from the whole population.

3.3 Study Population

The population for this study consisted of the three telecommunications firms in Kenya that are licensed to work and operate in Kenya. They include: Safaricom Limited, Airtel Kenya and Orange. This population was highly considered because of their uniqueness in the adoption and use of mobile phones that have eased access to social media platforms as emails, websites and the use of text messages.

3.4 Data Collection

Primary sources of data were collected with the help of unstructured questionnaires. The questionnaires were in the form of Likert scale whereby the respondents was expected to indicate their level of agreement on a scale of 1 to 5. The questionnaires will have three sections. Section A sought data on the general information of the respondents and the firm. Section B sought data on the extent to which Telecommunication firms are using business intelligence systems while section C elicited information on the benefits that Telecommunication firms get from using business intelligence systems. Section D sought information on the challenges that Telecommunication firms face when using business intelligence systems. Section E sought data on the influence of business intelligence systems on customer relationship management in Telecommunication firms in Kenya. Primary data was collected from the Heads of Departments in Business Intelligence and Customer Care and their assistants. This category of the respondents was considered because they are involved in managing business intelligence systems and decision making in matters that concern the customers. The questionnaires was administered using 'a drop and pick' later method at an agreed time with the researcher.

Designation	Total Population
Head of Business Intelligence Department	3
Managers	15
Analysts and Assistants	18
TOTAL	36

3.5 Data Analysis

The data collected was sorted, cleaned and coded before analysis. Data analysis was done using a regression model for objective one and descriptive statistics for objective two. Analyzed data was presented in tables and charts. The table below gives a summary of the data collection and data analysis techniques. A regression model was used to establish the relationship between business intelligence system and customer relationship management of Telecommunications firms in Kenya. Below is a regression equation, which was adopted by the researcher for data analysis.

$$Y = a + b_1 X_1 + b_2 X_2 + \varepsilon$$

Where:

Y is Customer Relationship Management

a is the Y intercept when x is zero

b_1 and b_2 are regression weights attached to the variables constants

$X_1 \ldots X_n$ are the coefficients

X_1 = Business Intelligence Systems

X_2 = Top Management Support

ε is the error term

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

This chapter presents the analyzed data and the findings that were obtained from the primary data. In order to check for accuracy, consistency and completeness, all the questionnaires that were successfully filled and returned, were cross-checked to ensure that they were filled correctly. The objectives of the study were to: determine the extent to which Telecommunication firms are using business intelligence systems, determine the benefits that Telecommunication firms get from using business intelligence systems, establish the challenges that Telecommunication firms face when using business intelligence systems and establish the relationship between business intelligence systems and customer relationship management in Telecommunication firms in Kenya.

4.2 Response Rate

Out of the thirty-six questionnaires were distributed to the respondents of Mobile Telecommunications firms, 32 were returned. This represents a response rate of 89% which was considered adequate to make generalization of the entire population. This is also supported by Mukuche (2015) who argued that a response rate of 80 percent and above is sufficient to make generalization for the whole population.

4.3 General Information

This section covers the analysis of the respondents and Mobile Telecommunication firms that operate in Kenya. The findings have been presented below.

4.3.1 Duration of Operation

The study sought to determine the duration in which Telecommunication firms had been in operation to establish the period that these firms had utilized business intelligence systems. The findings are shown in Table 4.1 below.

Table 4.1 Duration of Operation by the Organisation

Duration	Frequency	Percent
Less than 10 years	00	00
More than 10 years	32	100
Others	00	00
Total	32	100.0

Source: Research data, (2016)

From the above findings, the respondents agreed that the Telecommunication firms had been operation for a period of more ten years. This implied that the firms had utilized business intelligence systems for a reasonable period of time.

4.3.2 Position in the Organization

The study sought to determine the position of the respondents in the organization to establish whether they were qualified to give correct and consistent information with regard to the study objectives. The findings are shown in table 4.2 below:

Table 4.2 Position in the Organization

Position	Frequency	Percent
Head of Business Intelligence	**2**	**6**
Managers	**15**	**47**
Analysts/Assistants	**15**	**47**
Total	**32**	**100.0**

Source: Research data, (2016)

The results show that there was a tie of 47% of the respondents who were managers and the analysts. 6% of the respondents were Heads of Business intelligence. This was an indication that majority of the respondents were managers and analysts.

4.3.3 Length of Service in the Current Position

The respondents were asked to comment the length of service in the current position in order to establish whether they had a relevant business intelligence and customer service management. The findings are shown in Table 4.3 below:

Table 4.3 Length of Service in the Current Position

Period	Frequency	Percent
Less than 5 years	8	25
5-10 years	11	34
10-15 years	7	22
Above 15 years	6	19
Total	32	100

Source: Research data, (2016)

From the above findings, it was observed that 25% of the respondents had served in their current position for a period of less than 5 years. 34% of the respondents had served for a period between 5-10 years while 22% of the respondents had served for a period between 10-15 years. Only 19% of the respondents had served for a period exceeding 15 years. This implied that majority of the respondents had attained a relevant experience in their areas of specialization hence they were in a position to give accurate and reliable information.

4.4 Business Intelligence Systems

The study sought to determine the extent to which Mobile Telecommunication firms in Kenya utilized the following business intelligence systems: data warehouses, Extract Transform Load tools (ETL), On-Line Analytical Processing (OLAP) techniques and data mining.

4.4.1 Data Warehouses

The respondents were requested to indicate the extent to which data warehouses was utilized by Mobile Telecommunication firms in Kenya. The results are presented in Table 4.4.

Table 4.4 Data Warehouses

	N	Mean	Std. Deviation
The firm uses data warehouse to analyze data	32	4.32	.589
The firm uses data warehouse to extract information from the database	32	4.13	.699
The firm uses a data warehouse to collect information for decision making	32	4.05	.745

Source: Research data, (2016)

The results found that Mobile Telecommunications firms used data warehouse to: analyze data, extract information from the data base and collect information for decision making to a great extent. The mean scores were as follows: 4.32, 4.13 and 4.05 respectively. The standard deviation scores were as follows: 589, .699 and .745 respectively. This implied that data warehouses systems were utilized to a great extent by Mobile Telecommunications firms. The grand mean score was 4.17 and the standard deviation was .678.

4.4.2 Extract Transform Load Tools

The study sought to determine the extent which extract transform load tools were utilized by Mobile Telecommunication firms in Kenya. The results are presented in Table 4.5

Table 4.5 Extract Transform Load Tools

	N	Mean	Std. Deviation
The firm uses ETL for integration of data into data warehouse	32	4.71	.429
The firm uses tools and processes to extract data from one or many sources of systems	32	4.29	.476
The firm uses ETL to transform data into useable form	32	4.00	.723

Source: Research data, (2016)

The results in Table 4.5 found that Mobile Telecommunication firms used ETL for integration of data into data warehouse to a very great extent. The mean score was 4.71 and the standard deviation was .429. The firm used tools and processes to extract

data from one or many sources of systems and ETL to transform data into useable form. The mean scores were as follows: 4.29 and 4.00 respectively, and the standard deviation scores were: .476 and .723 respectively. The implied that extract transform load tools were utilized to a great extent. The grand mean was 4.33 and the average standard deviation was .543.

4.4.3 On-line Analytical Processing Tools

The study sought to determine the extent which on-line analytical processing tools were utilized by Mobile Telecommunication firms in Kenya. The results are shown in Table 4.6

Table 4.6 On-line Analytical Processing Tools

	N	Mean	Std. Deviation
The firm uses OLAP tool to analyze complex data	32	4.21	.694
The firm uses OLAP tools to search huge data files through automated generation of SQL queries	32	3.83	.524
The firm uses OLAP for interactive report generation	32	2.51	.758
The firm uses OLAP to provide a variety of methods for analysis and drilling of data	32	2.37	.712

Source: Research data, (2016)

The findings in Table 4.6 found that Mobile Telecommunication firms used OLAP tools: to analyze complex data and to search huge data files to a great extent. The mean scores were as follows: 4.21 and 3.83 respectively and the standard deviation

were as follows: .694 and .524 respectively. The findings further revealed that Mobile Telecommunication firms used OLAP for interactive report generation and to provide a variety of methods for analysis and drilling of data to a moderate extent. The mean scores were as follows: 2.51 and 2.37 respectively. The standard deviation scores were .758 and .712 respectively. This was an indication that Mobile Telecommunication firms used On-line analytical processing tools to a moderate extent. The grand mean was 3.27 and the average standard deviation was .672.

4.4.4 Data Mining

The study determined the extent to which data mining was utilized by Mobile Telecommunication firms in Kenya. The outcome is presented in Table 4.7

Table 4.7 Data Mining

	N	Mean	Std. Deviation
company uses data mining to predict the outcome	32	4.72	.423
The company uses data mining to generalize data resources	32	4.41	.463
The company uses data mining to ascertain the patterns and generalizations	32	4.00	.720

Source: Research data, (2016)

The results in Table 4.7 showed that Mobile Telecommunication firms used data mining to predict the outcome to a very great extent. The mean score was 4.72 and standard deviation was .423 respectively. The company used data mining to generate data resources and to ascertain the patterns and generalizations to a great extent. The mean scores were as follows: 4.41 and 4.00 respectively. The standard deviations

were as follows: .463 and .720 respectively. This was an indication that Mobile Telecommunication firms implemented data mining to a great extent. The grand mean score was 4.38 and the average standard deviation was .535.

4.5 Benefits of Business Intelligence Systems

The study determined the benefits that were derived from use of business intelligence systems by Mobile Telecommunication firms. The results are shown in Table 4.8.

Table 4.8 Benefits of Business Intelligence Systems

	N	Mean	Std. Deviation
Firm has a quick flow of information	32	4.32	0.662
The firm gets faster responses	32	4.28	0.671
The firm saves time and labour	32	3.69	0.668
The firm receives accurate and timely information	32	3.41	0.632
The firm understand its customer needs	32	3.27	0.539
The firm streamlines its business operations	32	3.24	0.547
The firm uses predictive models in sales	32	3.18	0.642

Source: Research data, (2016)

The results in Table 4.8 showed that Mobile Telecommunication firms had a quick flow of information, faster responses and saved time and labour to a great extent. The mean scores were as follows: 4.32, 4.28 and 3.69. The standard deviation included: .662, .671 and .668. The firms: received accurate and timely data, understood

customer need, streamlined its business operations and used predict models in sales to a moderate extent. The mean scores were as follows: 3.41, 3.27, 3.24 and 3.18. The standard deviations were: .632, .539, .547 and .642. This was an indication that Mobile Telecommunication firms benefitted from the use of business intelligence systems to a great extent. The grand mean was 3.63 and the average standard deviation was .623.

4.6 Challenges Involved in the Implementation of Business Intelligence Systems

The study sought to determine the challenges faced by Mobile Telecommunication firms in the implementation of business intelligence systems. The results are shown in Table 4.9.

Table 4.9 Challenges Involved in the Implementation of Business Intelligence Systems

	N	Mean	Std deviation
Lack of clear business intelligence standards	32	4.15	.786
Poor technical expertise	32	3.89	.875
Lack of support from users of the system	32	3.75	.765
Inadequate employee training and development programs	32	3.68	.675
Inadequate funding by sponsors as BI systems require huge capital injections	32	3.56	.786

Poor sensitization of employees on the importance of BI to the business preventing them from utilizing the system exhaustively.	32	3.32	.675
Lack of a good user interface that users can easily interact with and utilize.	32	2.98	.878

Source: Research data, (2016)

The results in Table 4.9 found that Mobile Telecommunication firms lacked clear business intelligence standards, poor technical expertise, lack of support from users of the system, inadequate funding by sponsors, poor sensitization and lack of good user interface to user and interact with business intelligence. The mean scores included: 4.15, 3.89, 3.75, 3.68, 3.56, 3.32 and 2.98 respectively. The standard deviations included: .786, .875, .765, .675, .786 .675 and .878. The findings concluded that Mobile Telecommunication firms faced implementation challenges to a great extent. The grand mean was 3.62 and the standard deviation was .777.

4.7 Influence of Business Intelligence Systems on Customer Service Management

To establish the influence of business intelligence systems and customer service management of Mobile Telecommunication firms, the study adopted a regression model.

Table 4.10 Model Summary

			Model Summary	
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.715ᵃ	.465	.310	.21254

a. Predictors: (Constant), data warehouse, extra transform load tools , on-line analytical processing tools, data mining

Coefficient of determination had a value of 0.465 which implied that business intelligence systems (independent variables) explained 46.5% of the variance in customer service management of Mobile Telecommunication firms.

Table 4.11 Analysis of Variance

To test model significance, analysis of variance was used. The results are shown in Table 4.11

Table 4.11 Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.00	4	3.00	81.08	.000[b]
	Residual	1.00	27	.037		
	Total	13.00	31			

a. Dependent Variable: customer satisfaction

b. Predictors: (Constant), data warehouse, extra transform load tools , on-line analytical processing tools, data mining

The study found that the regression model was statistically significant since its p-value was less than 5%.

4.8 Model Coefficients

The model coefficients table depicted values in column B showing the extent to which the value of the independent variable contributed to the value of the dependent variable. The other column depicted the level of significance of the study variables. The results are shown in Table 4.12

Table 4.12 Model Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Coefficients[a]						
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.164	.173		.948	.155
	Data warehouse(X_1)	-.011	.019	-.124	-.546	.391
	Extract transform load tools (X_2)	-.092	.057	-.366	-2.598	.026
	On-line analytical processing tools (X_3)	.005	.003	.353	2.757	.015
	Data mining (X_4)	.019	.067	.056	.279	.583

a. Dependent Variable: customer satisfaction

The regression equation obtained was as follows:

$Cs = 1.64 - .092X_2 + .005X_3 + \varepsilon$

Where Y = Customer satisfaction

X_2 = Extract transform load tools

X_3 = On-line analytical tools

ε = Error term.

Data warehouse and data mining were excluded from the regression model since they were found to be statistically insignificant. This is because their p-values were above 5%, p=.583 and p= .391 respectively. Extract transform load tools and on-line analytical tools were statistically significant in explaining the link between business intelligence systems and customer service management. This is because the p-values obtained in the regression model were below 0.05 (5%). P=0.026 and p=0.015 respectively.

Table 4.13 Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.672[a]	.391	.261	.2114

a. Predictors: (Constant), data warehouse, extra transform load tools ,

on-line analytical processing tools, data mining

The coefficient of determination attained a value of .391 which implied that business intelligence systems explained 39.1% of the variance in customer service management of Mobile Telecommunication firms.

Table 4.14 Analysis of Variance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	12.405	4	3.101	82.92	.000[b]
1	Residual	1.012	27	.0374		
	Total	13.417	31			

a. Dependent Variable: customer loyalty

b. Predictors: (Constant), data warehouse, extra transform load tools , on-line analytical

processing tools, data mining

Table 4.15 Model Coefficients

The results in Table 4.14 found that the regression model was statistically significance because its p-value was less than 5%.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.172	.154		.789	.127
	Data warehouse (X_1)	-.031	.017	-.127	-.632	.192
	Extract transform load tools (X_2)	-.081	.060	-.378	-2.499	.028
	On-line analytical processing tools(X_3)	.014	.029	.359	2.685	.010
	Data mining(X_4)	.020	.071	.061	.281	.483

a. Dependent Variable: customer loyalty

The regression model obtained was as follows:

$CL = 1.72 - .081X_2 + .014X_3 + \varepsilon$

The regression equation obtained was as follows:

$CL = 1.72 - .081X_2 + .014X_3 + \varepsilon$

Where Y = Customer loyalty

X_2= Extract transform load tools

X_3 = On-line analytical processing tools

ε = Error term.

Data warehouse and data mining were excluded from the regression model since they were statistically insignificant. This is because their p-values were above 5%, p=.028 and p= .010 respectively. Extract transform load tools and on-line analytical tools were statistically significant in explaining the influence of business intelligence systems and customer service management. This was because the p-values obtained in the regression model were below 0.05 (5%). P=0.028 and p=0.010 respectively.

4.9 Overall Customer Relationship Management

The study sought to determine the overall relationship management. The results are shown in Table 4.16

Table 4.16 Overall Customer Relationship Management

	Mean	Std
Extremely poor	2.10	.654
Below average	2.75	.675
Average	3.78	.897
Above average	4.10	.776
Excellent	2.98	.912
	3.142	.783

Source: Research data, (2016)

The results in Table 4.16 found that on average the overall customer relationship management of Mobile Telecommunication firms in Kenya was moderate. This implied that the customer services offered by Mobile Telecommunication firms did not meet customer expectations.

4.10 Influence of Top Management on the Adoption of Business Intelligence Systems for Customer Service Management

The study sought to establish the influence of top management on the adoption of business intelligence systems for Customer Service Management.

Table 4.17 Influence of Top Management on the Adoption of Business Intelligence Systems for Customer Service Management

	Mean	Std
No extent	2.05	.744
Small Extent	2.87	.812
Moderate Extent	3.93	.697
Great Extent	4.15	.736
V. Great Extent	3.34	.871
	3.268	.772

Source: Research data, (2016)

The results in Table 4.17 found that that the top management of Mobile Telecommunication firms in Kenya influenced the adoption of business intelligence systems for customer service management to a moderate extent.

4.11 Discussion of Findings

The most popular business intelligence systems were data mining, extract transform load tools, data warehouses and on-line analytical processing tools. Their mean scores were as follows 4.38, 4.33, 4.17 and 3.27. These results are consistent to Wachira (2009) who found that the most common business intelligence systems were data mining and data warehouses. The findings revealed that these business intelligence systems played an important role in enhancing efficiency and competitiveness in managing customer information.

Mobile Telecommunication firms benefitted in several ways from the use of business intelligence systems which involved quick flow of information, responses and saving time and labour. These findings are supported by Wesonga (2013) who indicated that use of business intelligence practices by enabled the firm to enhance information flow, feedback and time and cost saving.

The findings further revealed that the hindrances that affected implementation of business intelligence systems were unclear business intelligence standard, poor technical expertise and lack of adequate funds. These results conform to a study by Mukuche (2015) who concluded that lack of business intelligence standards and technical expertise were the main challenges that affected implementation of business intelligence systems.

The regression results found that on-line analytical processing tools and data mining were positively related to customer service management. Analysis of variance showed that the regression model was significant since its p-value was less than 5%. Extract transform load tools and on-line analytical tools were significant.

These findings are supported by Mukuche (2015) who found that Extract transform load tool was significant in explaining the relationship that existed between business intelligence systems and competitiveness of insurance companies.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter consists of the summary, findings and conclusion which has been done with regard to the general objective which was to determine business intelligence systems and customer relationship management in Telecommunications firms in Kenya.

5.2 Summary of Findings

The findings revealed that the most popular business intelligence systems included data mining, extract transform load tools, data warehouses and on-line analytical processing tools. The business intelligence systems attained the following mean scores: 4.38, 4.33, 4.17 and 3.27. Mobile Telecommunication firms benefitted in several ways from using business intelligence systems which included: quick flow of information, faster responses and saved time and labour to a great extent.

The challenges that faced Mobile Telecommunication firms in the implementation of business intelligence systems included lack of clear business intelligence standards, poor technical expertise, lack of support from users of the system, inadequate funding by sponsors, poor sensitization and lack of good user interface to interact with business intelligence systems. The mean scores included: 4.15, 3.89, 3.75, 3.68, 3.56, 3.32 and 2.98 respectively. The standard deviations included: .786, .875, .765, .675, .786 .675 and .878. The findings concluded that Mobile Telecommunication firms faced implementation challenges to a great extent. The grand mean was 3.62 and the standard deviation was .777. These results are consistent to Kamau (2010) who

concluded that the main challenges of implementing business intelligence systems included lack of adequate capital and inadequate skills and knowledge.

The regression results found that between business intelligence systems and customer loyalty were statistically significant since their probability values were less than 5%, p=.000 and p=.000 respectively. On-line analytical processing tools and data mining were positively related to customer service management. Extract transform load tools and on-line analytical tools were statistically significant in explaining the influence of business intelligence systems and customer service management. These findings are consistent to Mukuche (2015) who found that extract transform load tools was statistically significant in explaining the influence of business intelligence systems on competitiveness of insurance companies in Kenya.

5.3 Conclusion

The study concluded that the most popular business intelligence systems included data mining, extract transform load tools, data warehouses and on-line analytical processing tools. Mobile Telecommunication firms benefitted from using business intelligence systems through quick flow of information, faster responses and saved time and labour to a great extent. These firms faced challenges in the implementation of business intelligence systems which included lack of clear business intelligence standards, poor technical expertise, lack of support from users of the system, inadequate funding by sponsors, poor sensitization and lack of good user interface to interact with business intelligence systems.

The regression results found that on-line analytical processing tools and data mining were positively related to customer service management. The findings further revealed that extract transform load tools and on-line analytical tools were statistically

significant in explaining the influence of business intelligence systems on customer service management.

5.4 Recommendations

The study also recommends that Mobile Telecommunication firms should invest more in modern technologies and innovation. This is important in ensuring that firms have access to customer information which is important in decision making and tailoring products and services to match the growing needs of their customers.

Mobile Telecommunication firms should engage their employees in constant training and development programmes to increase their knowledge and skills in their work. This will improve employees' efficiency in managing business intelligence systems and impact positively on customer service management.

The top management should offer adequate support in terms of resources and facilities to provide the employees with an environment where they can effectively exploit their expertise in managing business intelligence systems and customer service management.

Communications Authority of Kenya should set policies to provide an enabling environment for Mobile Telecommunication firms to engage in fair and ethical business practices in managing business intelligence systems and customer services. This will improve the quality of services and value addition for products and services offered.

5.5 Limitations

The major limitation faced by the researcher was time and cost constraints. Collecting primary data consumes a lot of time and resources. The researcher had to make

relevant preparations in order to effectively manage different demands of the processes and at the same time manage time effectively.

The findings of this study and application thereof are limited to Mobile Telecommunications Industry in Kenya and therefore cannot be applicable directly or indirectly to another industry outside Mobile Telecommunications Industry. It is therefore important for the reader understand that these findings can only be used for comparative purposes and not direct application to any other sector.

The other challenge faced by the researcher was that there was no control over the data collection; some of the respondents gave out incomplete questionnaires while others failed completely to fill the questionnaires on condition that the information provided would not be divulged to a third party.

The respondents perceived the whole process of filling in the questionnaires as non-paying and a waste of time. This made it very difficult to convince the respondents to participate in filling and completing the questionnaires. The researcher had to make follow-ups which resulted to delays and inefficiencies.

5.6 Suggestions for Further Research

Future researchers should consider investigating the influence of factors such as government regulations and industry policies on business intelligence systems or other factors either as independent or moderating variables that can influence the decision of Mobile Telecommunication firms when making a decision on the kind of business intelligence system that a firm should adopt.

A comparative study should be conducted in another country both in the sub-region, the developed and developing world to ascertain the business intelligence systems used by Mobile Telecommunications and whether they impact on customer service

management. Then, the results can be compared and a plausible conclusion can be drawn based on facts.   45

A similar study should be carried out in another industry such as the banking sector to ascertain the relationship that exists between business intelligence systems and customer service management. This will enable the researchers to compare findings after which a more reliable and accurate conclusion can be drawn.

REFERENCES

Alain, H. & Martin B., (2009). Mastery of operational competencies in the context of supply chain management, Supply Chain Management: *An International Journal*, 14: 49 – 63

Alavi, M.; Leidner, D.E. (2001). Review: knowledge management and knowledge management systems, *MIS Quarterly* 25 (1): 107–136. doi:10.2307/3250961.

Arnott, D., Gibson, M., & Jagielska I. (2004). Evaluating the intangible benefits of business intelligence: review & research agenda. *The IFIP TC8/WG8.3 International Conference, 1-11, 10.1.1.94.8550*

Barney, J.B. (2001). Resource-based theories of competitive advantage: a ten-year retrospective on the resource-based view, *Journal of Management*, 27, 6, 643-50

Calof, J.L. & Wright, S. (2008). Competitive intelligence: a practitioner, academic, and inter- disciplinary perspective, *European Journal of Marketing*, 42, 7/8, pp.717-30.

Chuah, M.-H., & Wong, K.-L. (2013).The implementation of enterprise business: case study approach, *Journal of Southeast Asian Research*, 15.

David J. C., & Cynthia, A. M. (1995). *Competing on Resources: Strategy in the 1990s*, Harvard Business Review, July-August.

Dettmer, H.W. (1997). *Goldratt's theory of constraints: A Systems Approach to Continuous Improvement*, ASQC Quality Press, Milwaukee, WI

Fletcher K. (2008). *Marketing management and Information technology*, Prentice Hall Europe

Foss, N. J. (2002). More critical comments on knowledge-based theories of the firm, *Organization Science*, (7:5), 519–523.

Goldratt, E.M. (1990). *The Haystack Syndrome: sifting Information from the Data Ocean*, North River Press, Croton-on-Hudson, NY.

Goldratt, E.M. (2001). *What is this thing called the Theory of Constraints*, North River Press, Croton-on-Hudson, NY.

Grant, R.M. (2002). Toward a knowledge-based theory of the firm, *Strategic Management Journal* (17), *Winter Special*, 1,(2),109–122.

Greenberg, P. (2001). *CRM at the Speed of Light*, Berkeley: Osborne/McGraw–Hill

Hannula, M. & Pirttimaki, V. (2003). Business intelligence empirical study on the top 50 Finnish companies, *American Academy of Business*, 2, 2,593-9.

Hequan, W. (2009). Telecommunications: challenges & transformation [Technology Leaders Forum, *communications Magazine*, IEEE, 47(1), 10-13.

Hevner, A.R., & March, S.T. (2005). Integrated decision support systems: A data warehouse perspective. doi:*10.1016/j.dss.2005.05.029*

Hoopes, D.G., Madsen, T.L. & Walker, G. (2003). Guest Editors' Introduction to the Special Issue: Why is there a Resource-Based View, *Toward a Theory of Competitive Heterogeneity*, *Strategic Management Journal;* 24, 889–902.

Kak, A. (2008). Business intelligence and customer loyalty of Australian banks in Kenya, A review, *Global Journal of flexible systems management*, 2 (1), 34-35

Kamau, A. (2010). Challenges facing Telecommunication firms in the implementation of business intelligence, *Unpublished MBA Project*, Kenyatta University

Kendall, G.I. (1998). *Securing the future: strategies for exponential growth using the theory of constraints.* St. Lucie press /apics series on constraints management: Boca Raton, FL.

Ketchen, M. & Hult, A. (2007). Logistics management and organizational performance, *Journal of Logistics Management*, 1(2), 1-

Kim, S.W. (2006). Effects of supply chain management practices, integration and competition capability on performance, Supply Chain Management: *An International Journal*, 11, 3,241-8.

Koronios, A., & Yeoh, W. (2010). Critical success factors for business intelligence systems. Journal of Computer Information Systems, 23-32. Retrieved from *http://iacis.org/jcis/pdf/Yeoh_Koronios_2010_50_3.pdf*

Kothari, C. R. (2006). *Research methodology: methods & techniques*, New Delhi: New Age International (P) Ltd.

Lane, N. (2009). Advancing the digital economy into 21st Century, *Information Systems Frontiers*

Mabin, V. J. & Balderstone, S.J. (1999). *The world of the theory of constraints: a review of the international literature St. Lucie press series on constraints management*: Boca Raton, FL.

Magua, J. (2013). Application of Business Intelligence as a competitive tool of Telecommunications *firms in Kenya*, *MBA Project*, Kenyatta University.

Marketing intelligence practices on product development in the banking industry, a case of Standard Chartered Bank of Kenya Limited, *Unpublished MBA Project*, University of Nairobi

Moldovan, D. (2011). Business intelligence: data mining in European manufacturing firms, *Journal of Business Intelligence and Information Communication,* 22(10), 465- 466

Mukuche, A.K. (2015). Business intelligence and competitive advantage in insurance firms in Kenya, *Unpublished MBA Project*, University of Nairobi

Negash, S. (2004). Business intelligence. Communications of the Association for Information systems,
http://site.xavier.edu/sena/info600/businessintelligence.pdf

Nelson, .S. & Kirkby, J. (2006). *Seven 7 key reasons for CRM failures. Gartner Research Note*; accessed on 11th June 2016, *http://www.gartner.com/research.*

Nemati, H. (2005). The expert opinion: an interview with Emilie Harrington, senior manager, business intelligence practice's, *Journal of Global Information Technology Management*, 66-71

North, T. (1995). Master's Thesis: Carlin University. Internet and Usenet global computer networks: an investigation of their culture and its effect on new users in higher education, *URL http://foo.curtin.edu.au/thesis/default.html*

Oblinger, D.G. & Maruyama, M.K. (2010). *Distributed learning, cause professional paper series, 14. Boulder, Colorado: cause*, the association for managing and using information resources in Higher Education.

Olszak, C. M., & Ziemba, E. (2006). Business intelligence systems in the holistic infrastructure development and support of decision-making in the organization, *Interdisciplinary Journal of Information, Knowledge, and Management*, 1-12.

Omae, M.O., Langat, P.K., & Ndung'u, E. N. (2015). Mobile subscription, penetration and coverage trends in Kenya's telecommunication sector, *International Journal of Advanced Research in Artificial Intelligence*, 4(1),1-7

Ponomarjovs, A. (2013). Business values of business intelligence, *Business Values of Business* Intelligence.

Prescott, J.E. & Bhardwaj, G. (2009), Competitive intelligence practices, *A survey, competitive Intelligence Review*, 7, 1, S41-8.

Ranjan, J. (2010). Business Intelligence: Concepts, Components, Techniques and Benefits, *Journal of Theoretical and Applied Information Technology*, 1-11.

Reynolds, C. (2005). *Information systems for managers*, *West Publishing Co*

Rogers, E.M. (1997). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Schink, H. (2009). Current state and future challenges of real-time ETL. *Proceedings 2nd student conference on software engineering and database systems*. 6-10. doi: 10.1.1.148.5749

Stockdill, S.H. & Morehouse, D.L. (2013). Critical factors in successful adoption of technology: A checklist of TDC findings, *Educational Technology*, 32, 1, 57-58.

Tanev, S. & Bailetti, T. (2008). Competitive intelligence information and innovation in small Canadian firms, *European Journal of marketing*, 42, 7/8,786-803

Wachira, P. (2009). A Survey of Competitive Intelligence in the Insurance Companies in Kenya, *Unpublished MBA Research Project*, University of Nairobi.

Wehrmann, A. (2006). Organizational characteristics and information systems planning, *Information and Management*, 26, 327-340

Wesonga, T. (2013). Adoption of business intelligence practices by Old Mutual Kenya, *Unpublished MBA Project*, University of Nairobi

Wiliamson, A. (2010). Social networking and spending: Outlook; Accessed from, *http://www.emarketer.com/ reports/All/ Emarketer_2000621.aspx. (01, 29, 2010).*

Zabid, M.D., Rashid, A.I. & Saadiatul, I. (2002). *Executive and Management Attitudes towards Corporate Social Responsibility in Malaysia*, Corporate Governance, Bradford

Zott, C. (2003). Dynamic capabilities and the emergence of intra-industry differential firm performance: Simulation Study, *Strategic Management Journal*, 24 (2), 97-125.

APPENDICES

APPENDIX I: RESEARCH QUESTIONNAIRE

Introduction

This questionnaire is designed for the sole purpose of collecting data on the business intelligence systems and customer relationship management of Mobile Telecommunications firms in Kenya. The data collected was treated with a very high degree of privacy and it is meant for academic purposes only.

SECTION A: GENERAL INFORMATION

1. How long has your company been in operation in the Telecommunications industry?

(i).   Less than 10 years   [   ]

(ii)   More than 10 years   [   ]

2. What is your position in this company?

      1. Head of business Intelligence   [   ]

      2. Manager   [   ]

      3. Assistant /Analyst   [   ]

 3. How long have you been in this position?

      1. a) Less than 5 years   [   ]

      2. b) Between 5 to 10 years   [   ]

      3. c) Between 10 to 15 years   [   ]

      4. d) Above 15 years   [   ]

SECTION B: EXTENT OF USE OF BUSINESS INTELLIGENCE SYSTEMS

6. Tick among the list below the Business Intelligence Systems (BIS) tools that are used in the firm. Use the following rating: Tick appropriately.

1-Not used 2-Small Extent 3- Moderate extent 4-Great Extent 5-Very great extent

No	BI systems	1	2	3	4	5
	Data Warehouse					
1	The firm uses data warehouse to analyze data					
2.	The firm uses data warehouses to extract information from the database.					
3.	The firm uses a data warehouse to collect information for decision making.					
	Extract Transform Load tools					
1.	The firm uses ETL to transform data into a usable form					
2.	The firm uses ETL tools and processes to extract data from one or many sources of systems.					
3.	The firm uses ETL for integration of data into data warehouse.					
	On-line Analytical Processing Tools					
5	The firm uses OLAP tools to analyze complex data.					
6	The firm uses OLAP tools to search huge data files through automatic generation of SQL queries.					
7	The firm uses OLAP to provide a variety of methods for analysis and drilling of data.					
8.	The firm uses OLAP tools for interactive report generations.					
	Data Mining					
1.	The firm uses data mining to generalize data resources					
2.	The firm uses data mining to ascertain the patterns and generalizations of data resources.					
3.	The firm uses knowledge from data mining to predict an outcome.					

<u>**SECTION C: BENEFITS OF BUSINESS INTELLIGENCE SYSTEMS**</u>

7. Indicate the benefits that your firm gets from using business intelligence systems.

Use the following rating: Tick appropriately.

1-No extent 2-Small Extent 3- Moderate extent 4-Great Extent 5-Very great extent

No	Benefits	1	2	3	4	5
1.	The firm gets faster responses to your business problems due to automation					
2.	The firm is able to save time and labor of manually producing business reports.					
3.	The firm has a quick flow of information by allowing users.					
4.	The firm is able to receive accurate timely information for decision making					
5.	The firm understands its customer needs and buying trends					
6.	The firm streamlines its business operations to be more efficient based on what works and what doesn't					
7.	The firm makes future projection of sales and customer numbers					
	Others (specify and rate accordingly)					

<u>**SECTION D: CHALLENGES INVOLVED IN THE IMPLEMENTATION OF BUSINESS INTELLIGENCE SYSTEMS**</u>

8. Indicate the extent to which each of the following challenges is faced by the firm in implementing business intelligence systems. Use the following rating: Tick appropriately. 1-No extent 2-Small Extent 3- Moderate extent 4-Great Extent 5-Very great extent

No	Challenges	1	2	3	4	5
1.	Lack of clear business intelligence standards and processes to refer and fall back to					
2.	Poor technical expertise by system in-house BI implementers					
3.	Lack of support from users of the system especially of it exposes weaknesses in their departments					
4.	Inadequate employee training and development programs to enable them adequately and accurately utilize the BI systems and tools.					
5.	Inadequate funding by sponsors as BI systems require huge capital injections					
6.	Poor sensitization of employees on the importance of BI to the business preventing them from utilizing the system exhaustively.					
7.	Lack of a good user interface that users can easily interact with and utilize.					
8.	Others (specify and rate accordingly)					

SECTION E. INFLUENCE OF BUSINESS INTELLIGENCE SYSTEMS ON CUSTOMER SERVICE MANAGEMENT

9. Kindly provide approximate figures on the parameters outlined in the table below.

NO.	Metric	Unit of Measure (Quantity)
a	**Customer Satisfaction**	
1	The number of customers registered on your network	
2	The percentage of customers that have a wallet and frequently use it	
3	The number of new customers that were registered in the last quarter	
4	The number of dropped calls in the last quarter	
5	The number of resolution of customer complaints	
b	**Customer Loyalty**	
1	The number of customers that use premium services like USSD and short codes	
2	The number of local versus international calls by your customers in the last quarter	
3	The number of customers on Postpaid VS prepaid in last quarter	

THANKS ALL FOR YOUR PARTICIPATION

APPENDIX III:LIST OF MOBILE TELECOMMUNICATIONS FIRMS IN KENYA

i.   Safaricom Limited

ii.   Airtel Kenya

iii. Orange Telecom