

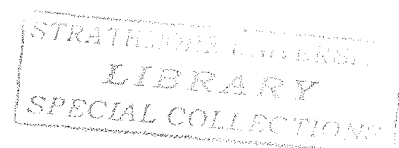
**Market Share Measurement for Universal Mobile Telecommunication System
Operators in Kenya**

by

Ominde Kageha Diana

Master of Commerce

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Market Share Measurement for Universal Mobile Telecommunication System Operators in Kenya

Ominde Kageha Diana

Submitted in partial fulfilment of the requirements for the Degree of Master of Commerce at
Strathmore University



June 2014



Declaration

I ascertain that this thesis submitted for the degree of Master of Commerce (Mcom) at Strathmore University is my own original work and has not previously been submitted to any other University. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references.

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Ominde Kageha Diana



June 2014

Approval

The thesis of Ominde Kageha Diana was reviewed and approved for Degree award by:

Vincent Omwenga, PhD

Senior Lecturer, School of Information and Technology,
StrathmoreUniversity

David Wang'ombe, PhD

Dean, School of Management and Commerce
Strathmore University

Prof. Ruth Kiraka

Dean, School of Graduate Studies
Strathmore University

DEDICATION

I dedicate this thesis to God the Almighty for the strength and health He granted me during this period.

ABSTRACT

The purpose of this study was determine the market share of key mobile operators of Universal Mobile Telecommunication Systems. Data was collected on identified factors under the voice segment by reviewing documents of the CCK quarterly report published by the CCK. This data was a representation of all the operators present from the year 2009 to 2013. The descriptive statistic of the data was carried out by analysis of standard deviations, percentages and means. The output of this descriptive statistic showed that the factors indeed have impact on the market share. The data was then fitted in the model and output generated on quarterly basis clearly outlining the percentage effect of each factor on individual's operators' market share.

This thesis assesses the usefulness of the identified factors for UMTS market share measurement. the inclusive of the factors is defined as a discrete event using logit model. The results obtained from logit model confirm the ability of TLMT (especially the Minutes of Use indicator) to estimate the current market share per operator and to anticipate change in one quarter ahead. Results from the out-of-sample GDP growth value are ambiguous. Nevertheless the Call Termination Rates significantly improved original measure based on a model with standard macroeconomic variables and therefore we conclude in favour of its measurement power.

The key findings of this study outline the rate at which the market is dynamic using logit model. This model incorporates all factors in the dynamic market and analyzes their effect on the UMTS operators. The result shows the dynamism which is consistent with logit model. Effective factors in this market share dynamism are: Number of subscription, Minutes of Use, Total Local Mobile Traffic, Call Termination Rate and GDP. The result also shows that the logistic model has a better explanatory and predictable power.

Therefore, implication of this research is that the quarterly report produced by CCK with regards to the market share controlled by each operator can be revised and factors mentioned in this study can as well be considered during the percentage estimations. The conclusion is, for effective policy making and fair competition amongst the operators in this market, the regulatory board can consider the call termination charges across the networks within the market as a factor influencing and affecting the operators' market share.

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LIST OF ACRONYMS/ABBREVIATIONS

3G	Third Generation Mobile Telecommunications
CCK	Communication Commission of Kenya
GDP	Gross Domestic Product
MoU	Minutes of Use
TLMT	Total Local Mobile Traffic
UMTS	Universal Mobile Telecommunication System
ADF	Augmented Dicki Fuller test
CTR-	Call Termination Rates

CHAPTER ONE

INTRODUCTION

1.1 Introduction to the study

According to Banerjee and Area (2004), market share is a key indicator of a company's growth. It also influences the thinking and strategic planning of an organization as indicated by O'Regan (2002). However, in telecommunications industry market share is not regarded as the best measure of organizational performance due to its dynamism as a result of competitive pressures in a fast-growing and technology-driven industry (Nakil, 2013). The relevant actual market share has therefore been difficult to determine. In an attempt to bring out a clear measure of market share, this study considers Total Local Mobile Traffic, Minutes of Use, Call termination rates, Number of subscription and Gross Domestic Product (GDP) as factors of UMTS market share, that would help in predicting and determining their effect on market share (Guyon and Petiot, 2011) citing (Michalek *et al.* 2005).

1.2 Background

Dynamism market as defined by Golinelli, R. & G. Parigi (2004) as a market characterized by constant change in activities. Actual market share describes the position of a firm within its industry; it is therefore often considered as the most important indicator of company's success (O'Regan, 2002). In Kenya, market share of the mobile operators is used to determine the percentage of the market that they control and ultimately the profitability of the players in the market. The implication has always been the bigger the market share the more successful the firm. Thus analysis of market share is a fundamental tool for predicting and determining the market share of key players in the Kenyan telecommunication industry.

Up to 1990's many firms in Kenya enjoyed unchallenged monopolies and government protection. Deregulation and globalization have however turned around the Kenyan marketing environment. Globalization has spearheaded the integration of the Kenyan economy with other world economies such that Kenya is now part of the global village. The power of information and technology, deregulation, globalization of markets and stiff competition has made customers better educated, more inquisitive, sophisticated and deciding. The marketing environment has tremendously

changed thereby posing serious implications and challenges to the survival and profitability of firms. Following the liberalization of the telecommunications sector in Kenya in 1998, two mobile telephone service providers, Safaricom limited and Kencell (now Airtel) communications limited were licensed. In addition, a third mobile service provider involving Vtel Ltd. of Dubai won the bid to operate in Kenya in 2006 (essar telecom). This shows that the industry is still growing and there is potential of more entrants of new service providers in the industry.

1.2.1 Determinants of Market Share

Changes in market share are a function of consumer behavior that is influenced by a variety of aspects such as cultural, social, and personal factors. Kotler and Keller (2006) indicate that cultural factors exert the broadest and deepest influence to consumer behavior. Customer commitment is one of the social factors that are strategically used by most organizations in taking decisions that enhance their profits by reducing marketing costs and increasing market share of the firm.

Factors that explain customer commitment vary across industries and contexts. In Kenya's mobile service industry commitment is largely influenced by consumer psychological and emotional factors such as their level of trust in the firm. According to Riquelme (2001) the level of trust is determined by the customer's service experience with the service provider on key areas such as quality and reliability of the service provider's network.

Based on the nature of the market, call termination costs may positively or negatively influence consumers' relationship with a service provider. High call termination charges increases commitment and low call termination charges increases consumer's freedom to quit the relationship with a service provider (Andersson, 2012). Service providers which invest on building trust are likely to attract and retain customers.

Berman, Battino and Feldman, (2011) Conversely indicates that, when trust has been established between service provider and customers, raising switching costs contributes to strengthening customer commitment and hence leading to better firm performance. Conceptualization of commitment should therefore, be taken into consideration when determining the number of subscribers which has been the base factor for determining market share of each key player, in addition to trust as a factor too, that is built between consumers and service providers

1.2.2 Telecommunications Industry in Kenya

Kenyan telecommunications industry consists of many key players that can be put into major categories such as telecommunications operators, regulators, government agencies, equipment vendors, services users, and standards organizations (Andersson, 2012). The level of competition among telecommunications operators and among telecommunications vendors vary due to rapid evolution of the UMTS market. Rapid evolution makes the market more dynamic hence leading to difficulties in market share predictions. According to Nakil (2013) regulators argue about effective competitiveness of the mobile market across both the developed and developing countries. Kenya, being a developing country, is not exempted when it comes to non-competitive mobile markets.

The mobiletelecommunication sector is characterized by dynamic evolution creating a dramatic difference in market share competition amongst the key players (Communications Commission of Kenya (CCK), 2013). At present, mobile telephones are essential product of modern telecommunications in Kenya. More of the populations have mobile telephones and the market is still growing (Towett, 2002 as reported in Muturi, 2004). For the last one decade marketing environment for telecommunications firms in Kenya has been dynamic. This has led to a change towards competitive edge of value added products in mobile phones market. Diversification of product range has then been a bid for the mobile operators to rope in more subscribers and generate more revenues.

Statistics based on customer subscriptions have shown that Safaricom has the largest market share compared to the other three cellular network mobile service providers, that is, Orange, Essar telecom Kenya, and Airtel (CCK, 2013). Even though Safaricom has the largest market customers from its network and all the other operators often move from one operator to the other. This movement as well as the effects of regulatory framework on the mobile market has created inefficient competition in the market.

The last quarter report for the year 2013, according to CCK (2013), UMTS market penetration declined from 78.0% (30.7 million subscribers) in the second quarter of 2012/2013 financial year to 75.8% (29.8 million) in the last quarter. The decline was mainly attributed to an estimated 2.4 million unregistered SIM cards which were switched-off during the SIM card registration exercise carried out during that quarter.

1.2.3 Kenyan Communications Industry Regulatory Framework

The Communications Commission of Kenya (CCK) was established in February 1999 by the Kenya Communications Act, 1998, to license and regulate telecommunications, radio communication and postal services in Kenya. The Commission is responsible for developing and coordinating the policies and strategies with respect to development and operation of telecommunication services in Kenya. CCK licenses telecommunications operators and service providers and monitors their performance on a continuous basis to ensure that they discharge the obligations as stipulated in their licenses, and in keeping with the provisions of the Kenya Communications Act 1998 and the Kenya Regulations 2001. The Commission's mandate in regard to the sector involves telecommunications licensing, telecommunication licensing enforcement, industry and consumer affairs, universal service obligations, tariff regulation and market analysis.

Kenya Communications Commission (Amendment act, 2009), prohibits the operation of communications systems and provision of communications services without a license from the CCK. Licenses are issued in accordance with the prevailing market structure as specified in the Licensing Framework or Regime. Today, the licensing process is informed by the Unified Licensing Framework, which the Commission adopted in July 2008. Upon obtaining the necessary licenses, operators and service providers are required to keep their respective licenses valid.

CCK in its duties is tasked with the mandate of ensuring smooth and level playing ground for all mobile operators. It is a body that regulates all communication concerns of the country by providing a regulatory framework for the promotion of fair competition and equal treatment in the communications sector. This framework provides protection against the abuse of market power or other anti-competitive practices within the communication sector. In that line, they produce quarterly reports that are able to depict how the market share is owned by the concerned players in the market. This market uses double auction method in measuring the market share. Its accuracy in measurement has raised a major topic in prediction market research. This study therefore proposes a method that aggregates the data provided by such a dynamic market in a different way by only accounting for the most knowledgeable market participants.

1.2.4 Principles of market share measurement

Market share is influenced by various factors. The major factors studied include product quality, after sales service, brand name or image, market power, regulatory, contractual obligations and their effect on performance hence market share. With today's highly competitive market in mobile sector, satisfaction of consumer needs and preferences is a very important issue, owning the largest market share has been the competing edge for every key player in the market. For several years, considerable research has been devoted to preference measurement and modeling within various fields of research.

In market share, the influence of product attributes on preference has been investigated by means of both compositional and decomposition methods. Method for measuring preferences, Conjoint Analysis (CA) (Green and Rao 1971), is perhaps the most widely applied by marketing researchers (Chakraborty *et al*, 2002; Huber, 2005). According to Guyon & Petiot (2011) citing Huber (2005), 85% of current managers find CA to be the best adapted and most widely used method during product strategy development phases. A number of models have been used elsewhere to determine or rather predict market share. Such models can be useful in the dynamic markets like mobile markets and more precisely in the Kenyan context.

1.3 Problem Statement

The mobile market is very dynamic. As a result, it is difficult to determine the actual market of the key players and factors influencing market share for the different players. In Kenya, the operators in this market rely on Communication Commission of Kenya quarterly reports that determine market share on the basis of customer subscription. By so doing, more influential factors like call termination rates, Minutes of Use and Total Local Mobile Traffic are not considered. Given the dynamic nature of this market, there is a need to use a model that will be able to incorporate all the key factors that influence the mobile market and yield convergent results for different rating scales, and outputs estimates that match regression reliability. Further, according to Guyon and Petiot (2011) many factors have to be considered in order to determine market share. Nakil (2013) also indicates that preference measurements can indeed help with estimating market share by assessing dynamic customer preferences. This study looks at effects of regulatory policies on competition in the mobile market, while addressing the relationship between minute of use and total local mobile traffic.

1.4 General Objective

The ability to measure and forecast market share remains a challenge for many managers especially in dynamic markets, such as the telecommunications sector (Kumar, Nagpal, and Venkatesan, 2002). In order to accommodate the unique dynamic characteristics of the telecommunications market, a predictive model is used to analyze market share. The study will demonstrate its predictive ability with a real world experiment in the Kenyan context.

1.4.1 Specific Objectives

- i. To identify the components that determine UMTS market share in Kenya
- ii. To establish the effect of the determined components on UMTS market share in Kenya
- iii. To establish the predictability of the model in analyzing the effect of the determined components in UMTS market share in Kenya

1.5 Research Questions

- i. Which factors determine market share in the UMTS market in Kenya?
- ii. What effect do the identified factors have on UMTS market for mobile operators in Kenya?
- iii. What significance is the model on UMTS market share measurement?

1.6 Scope of the study

Telecommunication industry is wide and therefore, this study is only limited to Universal Mobile Telecommunication Systems (UMTS) in the Kenyan market. Specifically, the study will look at three key factors that influence the Kenyan UMTS market namely; regulatory, minutes of use, total local mobile traffic and number of subscription; addressing their relation and influence on the market share for service providers, majorly the UMTS. The data to be used in the analysis of this research will be drawn solely from statistical data provided quarterly by CCK. Time period of data will range from 2009 giving one year allowance of the last service provider to adjust in the market i.e. Essar telecom that join the market in 2008. This will be an analysis of 5 years from 2009 to 2013. This analysis will look at Mobile voice traffic service which is one area of business segment of the service providers.

1.7 Justification

Mobile service providers rely on reports from CCK to determine their market position, the method used is not sufficient and accurate to address the dynamic nature of the Kenyan UMTS market, and therefore, predictive models can be used instead. Furthermore consumers of this market are highly familiar with their products which are of great interest and significant proportion of their spending. The players advertise their products in the market, making consumer recall the factors that influence their buying. Findings of this study will be of significance to the service providers and Communication Commission of Kenya.

Finding of this study will be of great help to the key player on understanding factors that influence UMTS market share and able to identify themselves with them. This study will show clearly how this dynamic mobile market can be measured and how strategic decisions can be drawn out of it, creating competitive advantage for them.

This study will be beneficial to the CCK, since it will be proposing to them a predictive model that will help them carry their regulatory obligation with ease. This model will incorporate more factors that have not been considered during its quarterly report, therefore giving them more insight of how the measurement of the market can be predicted.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Telecommunication industry has a wide structure that entails key players such as telecommunication operators; telecommunication regulators and government agencies; telecommunication equipment vendors; telecommunication services users; telecommunication standards organizations among others. Similarly, telecommunication vendors are many in number and the major categories are: cellular networks, fixed telephone network operators, data network operators, internet service providers, postal services operators, television providers and radio operators (Andersson, 2012).

Mobile telecommunication sector as indicated is a subsector of the wider telecommunication industry. In Kenya, there are four mobile operators namely Safaricom, Airtel, Orange and Essar Telecom Kenya. The Kenyan mobile sector has experienced growth over the years in terms of customer base where many citizens own mobile phones. In order to remain relevant in the market, mobile operators need to know the percentage of the market they control. Market share is often used to describe the position and success of a firm in an industrial sector (O'Regan, 2002). Market share analysis is therefore the method of comparing the status of a business with its competition in the same sales region (Kotler and Keller, 2006). While predicting mobile market share in Kenya, mobile telecommunication operators rely on reports from CCK that are produced quarterly a year. However, Guyon and Petiot (2011) suggest that scientific models can be used in market share predictions to help industries in product development; pricing and positioning.

2.2 Factors that influence UMTS market share

The UMTS market as indicated in section 1.2.2 is very dynamic and competition in this market is rapid and differs dramatically across developed countries. Nakil (2013) argues that the markets are still not effectively competitive due to the regulatory policies for different countries. The scarcity of available spectrum is also a major limitation of number of mobile operators, which means these markets are intrinsically oligopolistic; leading to more pre-determined competitiveness of the mobile industry as a result of technological constraints (Andersson, 2012). In spite of change from a monopolistic regulatory framework to full competition, current UMTS operators such as

Safaricom are often the strongest market players. The introduction of call termination rates to reduce monopolistic has been on rise including the Kenyan market (Andersson, 2012). However, these operators have a significant market power in many countries and are often regarded as money-spinning in the telecommunication markets.

First mover advantage enjoyed by the incumbent has created a great barrier to many entrants in the market (Nakil, 2013). Moreover, it is rare to notice changes in the operator's market share due to higher variation in number of subscribers as a result of rapid changes in minutes of use and total local mobile traffic. Despite of rapid diffusion of UMTS services and several years of competition, many regulators argue that the UMTS markets are not effectively competitive. Therefore, the strengthening of regulations in the UMTS markets may reflect on the current status of market competition (Grzybowski, 2005).

The market power and performance also has impact on the UMTS market share. The establishment of a competitive UMTS, particularly in 3G mobile markets, has foreseen the growth in market power (Anderson, 2012). As the GDP grows the performance of the players improves due to its increase in number of subscribers where one individual can be a subscriber to different service providers at the same time (Frank, 2004). Increase in GDP has led to increase in money supply that influence the use of services provided in the UMTS market. It's with this reason that GDP influence the TLMT and minutes of use hence the variation in the market share for operators in voice segment.

2.3 Models for analysing market share

Empirical studies on market share analysis and interaction of its determinants with performance on industrial organization is relatively small in empirical industrial. Among these few empirical studies, Nakos (1993), estimates a simultaneous equations system for market share measurement of leading industrial firms; the study found out that market share and demand growth have positive effects on profitability. Likewise, Abramowitz and Brown (1993) indicated that market power leads to the non-contestability a study on airline routes. The study further indicates that, higher market shares are allied with higher prices. This study mainly examined airline pricing and market structure determination for the U.S. domestic airport-pair routes.

On the other hand a study on market share in telecommunication (Mixon and Hsing 1997) indicated that, market share is mainly determined by long- distance rates among major carriers and government regulation that is in place. Studies on this UMTS market majorly focus on diffusion of mobile telecommunication world widely with its variations across countries (Gruber and Verboven 2001). The study looked at EU (European Union) countries and estimated a logistic diffusion of its mobile telecommunication. Grzybowski (2005) and Koski and Kretschmer (2005) adopted a simultaneous model to examine not only the determinants of mobile diffusion but also those of mobile prices. These two studies analyzed the impact of regulatory and competition variables on prices and demand for mobile services.

In Koski and Kretschmer (2005) empirical model, experience non-random selection problem that was as a result of cross-country differences in the timing of the commercialization of 3G mobile services was addressed by incorporating the determinants of entry in their model. Despite of these two studies considering different regulatory variables, their findings indicated that the regulatory policies have significant effects on the level of prices and the demand for mobile services. However, there exists no econometric study that addresses the impact of regulation and market power on UMTS market share and performance.

These researchers therefore have something in common. Most of them have adopted a method known as instrumental variable estimation with an exception for Mixon and Hsing (1997). It is therefore certain that market share affects and also is affected by performance and regulatory policies. The current structure- behavior- performance literature accepts this two- way causal relationship between market share and profitability. These researchers also used intra- industry firm data which is inevitable when the study focus on market share a firm. More so, in general, their findings provides of a positive role of market share in increasing prices and profits. Therefore, this study inherits some common features from these researchers and presumes that a mobile operator's market share is affected by regulatory, Gross Domestic Product (GDP), and market power, which in turn affects performance, while performance plays a role in changing market share.

Table 2. 1: Summary of some Models on Market Share Measurement

Study	Model	Main finding factors	Others
Nakos (1993)	simultaneous equations	Demand growth	Demand growth have positive effects on profitability, and an increase in the stock of goodwill results in increases in market share as well as performance
Abramowitz and Brown (1993)	structural equation	Market power	Market power leads to the non-contestability of airline routes and also, higher market shares are associated with higher prices
Mixon and Hsing (1997)	Bass	Regulation	market share is mainly determined by long-distance rates among major carriers and government regulation
Gruber and Verboven (2001)	Logistic	DIG	The regulation/ competition effect was smaller than the technology effect
Grzybowski (2005) & Koski & Kretschmer (2005)	simultaneous	Regulatory	Examine not only the determinants of mobile diffusion but also those of mobile prices.
Frank (2004)	Logit	GDP	Wireless network coverage affected the number of potential adopters

2.4 Market share measurement and prediction

Many organizations rely on market statistics to predict their market share. Different sectors worldwide have different ways of predicting their market share. The essence of market share prediction according to (Guyon and Petiot, 2010) is to help firms realize the importance of innovation, knowledge, e-commerce and the deployment of high technology in the current dynamic environment so as to remain competitive. Given the dynamic nature of business environments, many players in different sectors are faced with challenges of analyzing the percentage of market they own or control. As a result, understanding what customers' desire and being able to present attractive products in the market has proven difficult.

In order to measure and predict the mobile operators market share we seek to model an equation of the factors that determine the market share.

Let market share measurement and prediction be f

We therefore seek to model $f(P_r, MoU, S, GDP, \text{and } TLMT)$

Where:

P_r = Regulatory (call termination rates)

S = number of subscription

MoU = Minute of use

GDP = Gross domestic product

$TLMT$ = Market power (Total local mobile traffic)

This model will be of equation for an S shaped curve, which also has been used by Frank (2004) for studying the diffusion pattern of mobile phone.

$$S_t = \frac{S^*}{1 + e^{-(a+rt)}} = \frac{S^*}{1 + ke^{-rt}} \dots \dots \dots (2.1)$$

Equation (1) is the logit equation of the market share measurement where S_t is the number of subscribers of a given mobile operator in a time t and S^* which is a function of population measured in terms of gross domestic product, is the optimal number of the subscribers of a given operator; r is the rate of change in market share per operator in the market.

According to equation (1) we have:

$$S_t = \frac{S_t^*}{1 + e^{-(a+rt)}} \dots \dots \dots (2.2)$$

Where S_t^* is the potential number of subscribers of a given mobile operators; r , the relative growth rate in market share which varies in time. S_t^* can be defined as

$$S_t^* = \gamma P N S_t \dots \dots \dots (2.3)$$

In (3), S^* is the total potential number of subscribers per operator and γ is the penetration coefficient in the market. r will therefore be growth rate in market share that varies with time.

$$\text{Therefore } r_t = \beta_0 + \beta_1 GDP + \beta_2 P_r + \beta_3 TLMT + \beta_4 MoU + e \dots \dots \dots (2.4)$$

In which GDP, P_r TLMT and MoU, is gross domestic product, call chargers per minute, total local mobile traffic, and minutes of use.

The first derivative of equation (2) will give us the total number of subscriber or new number of subscriber at time t . the second derivative will show the changes in the number of new subscribers at time t . from equation (2) we have:

$$\frac{S_t}{S^*} = \frac{1}{1 + e^{-(a+rt)}} \Rightarrow \frac{S^*}{S_t} = 1 + e^{-(a+rt)} \dots \dots \dots (2.5)$$

Using equation (5) we get:

$$S_t' = \frac{r S_t (S^* - S_t)}{S^*}$$

$$S_t'' = \frac{r S^* S_t' - 2r S_t'}{S^*} \dots \dots \dots (2.6)$$

Therefore in this study second derivative will give the market share at a given change in time clearly outlining the percentage effect at which each factor affects the market share.

2.5 Conceptual Framework

INDEPENDENT VARIABLES

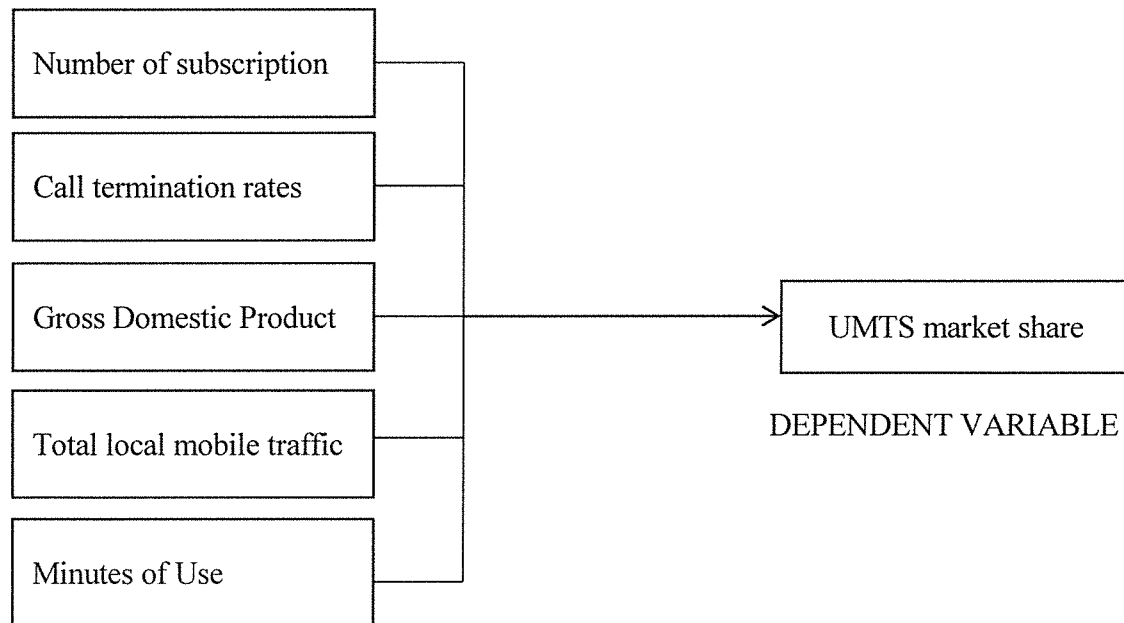


Figure 2. 1: Conceptual frame work of factors influencing the UMTS market share

2.5.1 Operationalization of the variables

The Total local mobile traffic and Minutes of Use are used as measures of the market power while Call termination rates is used to measure the regulatory impact or influence on the market share. The GDP is used as a time variable factor to articulate the differences in market share at a given rate of GDP. Number of subscription has a direct effect on the market share through customer base. The table below summarizes the operationalization of the variables

Table 2. 2: Operationalization of the factors

Variables	Define	Measure
Market share	This is the percentage of the market an operator is deemed to be controlling Huber (2005)	It is measured as a result of percentage effect of the variables that are deemed to be influencers of the

Variables	Define	Measure
		operators market. Guyon & Petiot(2011)
Minutes of use	These are the accumulated minutes used by the subscribers of an operator by a given period of time	It is measured in minutes CCK (2013)
Total local mobile traffic	These are the accumulated mobile traffic on the spectrum by the subscribers of the operator. In this study we only consider the voice traffic.	It is measured in millions of minutes CCK (2013)
Number of subscribers	These are given customers of an operator in the market. In the context of this study the subscribers targeted are the voice users.	This is measured in millions of population. CCK (2013)
GDP	Gross domestic product	This is measure in Kenyan shillings

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The study uses an accurate measurement and prediction of UMTS market share for mobile operators in Kenya. The study aims to answer some key questions on related models for analyzing market share for mobile sectors as well as other sectors. This chapter discusses the factors included in study and the statistical techniques to be applied in measuring and predicting the market share. In trying to come up with the methods to help in data collection, analyzing and presentation, the researcher considered the following areas to give a clear outcome of the research: the design of the research, sampling of the population, methods of data collection, analysis and presentation of data.

3.2 Research design

A research design specifies the purpose of the study, the approach of the study and the strategy used for the study (Saundres, Lewis, and Thornhill, 2000). Given that there is hardly any empirical study on adoption of analytical model in market share prediction and measurement for UMTS in Kenya, this study sought to explore and identify the factors affecting the UMTS market in Kenya using logit model. This study adopted a cross sectional design involving the use of indexing to collect data on a wide range of variables at a given point in time.

A sample of UMTS market operators were selected to participate in the study and relevant information concerning factors related to UMTS market was gathered. This was done by use of censoring technique. The study also adopted the quantitative approach to analyze the relevant data. The quantitative research approach involved numerical representation and manipulation of the data for the purpose of describing and explaining the phenomenon of incorporating more than one factors in the market share measurement.

3.3 Target population

The target population of this study comprised of all UMTS operators; Safaricom Limited, Airtel Limited, Orange Kenya and Essar Telecom famously known as Yu. These operators were chosen

for this study because of two reasons. First, all of them are cellular network providers and report to CCK on quarterly basis. Secondly, they all deal with voice segment which is the target business segment of this study. According to the CCK, there are an estimated of about 27millionindividual users or customers attached to UMTS operators' including both users of voice and data, and these constituted the target population of this study.

3.4 Data collection

In this study, documents from the CCK which constitutes quarterly sector statistical reports were reviewed. The data extracted from these documents was majorly on Minute of Use per operator; the Total Mobile Traffic; the call termination rate; and the number of mobile subscribers. Indexing technique was applied during document review to obtain the required data for content analysis. Prior to the exercise of data collection, permission was sought and secured from the relevant UMTS operators. In addition, two research assistants were employed and trained in data collection techniques to enable them effectively seek documents for data collection from CCK.

3.5 Data analysis and modelling

Analytical approaches used in this study includes the descriptive analysis where mean, standard deviations and percentages have been used. This descriptive analysis illustrates the extent to which the factors determined affect the various operators' market share in UMTS market. A model is then developed from the existing frank model, and this aims at incorporating the effect of those factors in determining the actual market share controlled by the various operators in the UMTS market. These are briefly explained in the following subsections.

3.5.1 Descriptive analysis

Descriptive analysis has been used to describe the existing data prior to fitting it into the model for analysis output. The descriptive techniques used are mean, standard deviation in attempt to see how sparse the data hence its conclusion of whether the factors have effect on the entire operators' market share. The percentages are also used as a measure of how much market is controlled by a given operator as well as the percentage effect of each factor on operators' market share. A percentage is defined as a proportion of sub group or sample and it ranges from 0% to 100%. The concept is useful in comparing the operators' market share in relation to their influencing factors.

3.5.2 Logit model

The second and third objective of this study was to establish the effect of the determined factors on UMTS market share and establish the predictability of the model in analyzing the factors effects. Logit model was specified and estimated and used to predict the effect of the factors on UMTS market share. The logit model is useful in situation where there is need to predict the presence or absence of a characteristic or outcome based on values of a set of predictors variables. Since the dependent variables, UMTS market share has two possible outcomes, that is, market share increases or decreases, the logit model analysis technique was best suited for this study. The model exhibits a binomial distribution with a probability lying between 0 and 1. The probability that market increases is given by equation (1)

$$S_t = \frac{S^*}{1 + e^{-(a+rt)}} = \frac{S^*}{1 - ke^{-rt}} \dots \dots \dots (3.1)$$

Where

S_t = probability that market increases or decreases

R = are independent variables in the model

Equation 1 as picked from chapter 2 represents the cumulative logistic distribution function related to r_t . If S_t the probability of market increasing or decreasing is given by equation 1, the $(1 - S_t)$, the probability of not increasing or decreasing is:

$$1 - \frac{S^*}{1 - ke^{-rt}} \dots \dots \dots (3.2)$$

Combining equation 1 and 2 we get the logit model equation as derived in chapter 2 section 2.4 and as shown below:

Equation (6) from section 2.4 indicates our final equation of our model

$$S_t'' = \frac{rS^*S_t' - 2rS_t'}{S^*}$$

Where:

S_t'' is second derivative that gives us the possible market share at agive time period

r is the $\beta_0 + \beta_1GDP + \beta_2P_r + \beta_3TLMT + \beta_4MoU$

Where GDP is the gross domestic product, P_r is the call termination charges which are an indicator of regulatory effect on market share; TLMT is the total local mobile traffic, an indicator of market power of individual player on market share and lastly is MoU which is the minutes of use.

3.6 Research quality

Research quality is measured by two aspects; the reliability and validity of the findings and of the techniques used. Validity and reliability are critical features of effective research. Validity refers to the extent to which questions in an instrument accurately measure the variables there in (Hair et al, 2003). While reliability refers to the degree to which asset of variables are consistent with what they are intended to measure (Amin, 2005). The validity of the instrument was established by it being an improvement of an already existing model. Logit model as developed by Frank was subjected to a dynamic environment considering same factors considered in this study hence making it a valid tool to use for UMTS market share, while the reliability of the items in the instruments (factors) was established using Cronbach's Alpha. The Cronbach's Alpha was computed using the following formula:

$$\alpha = \frac{k}{k-1} \left\{ 1 - \frac{\sum \delta_k^2}{\delta^2} \right\}$$

Where $\sum \delta_k^2$ is the sum of the variance of k parts (factors) of the test and δ is the standard deviation of the test. A minimum Cronbach's Alpha value of 0.6 was used to indicate reliability of the constructs.

Table 3. 1: Result of Reliability Analysis

Variables	Number of items	Cronbach's Co-efficient
Number of subscribers	5	0.73
Call termination rates	5	0.68
Minutes of Use	5	0.81
Total Local Mobile Traffic	5	0.89
GDP	1	0.76

The result of reliability analysis reflected a Cronbach's alpha coefficient ranging from 0.68 and 0.89, implying that all the factors considered in the data collection instrument were reliable and could be used to collect the relevant information.

Furthermore Joppe (2000) indicates that reliability is the extent to which consistency exists in research result over time. The results of this study are consistent across the operators and years studied.

3.7 Ethical consideration

The goal of ethics in research is to ensure that no one is harmed or suffers adverse consequences from research activities (Cooper and Schindler, 2001). The following was done; first information on Minutes of Use and Total Local Mobile Traffic were collected where, the researcher considered upholding a stronger condition of anonymity if need be. Secondly, the researcher also maintained the privacy of the research data collected.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents data and analysis as obtained from CCK website portal on the Telecommunication Industry quarterly statistical report. The report captures data on number of subscribers, call termination rates, total local mobile traffic and minutes of use for the four mobile operators. The data covers a period between 2009 -2013 financial years. The analysis of the data is done to a total of four cellular network operators in the telecommunication industry, where the output clearly shows the effect of number of subscribers, minutes of use, total local mobile traffic and call termination rates has on the market share of the operators. This chapter also presents and interprets the model findings and offers an expounded discussion on the results. Comparison of the current way of measuring and the output generated by the model is clearly discussed and variation of the two is illustrated.

4.2 Components of the Telecommunication Industry quarterly statistical report

It was found that the CCK quarterly reports had four major components; number of subscribers, call termination rates, total local mobile traffic and minutes of use. Table 4.1 gives the corresponding units of measurements for the components. These components are established from the CCK quarterly reports as influential factors of market share and major supported by Guyon and Nakil in the review literature.

Table 4. 1: The unit of measure of the variables

Components	Units of measure
Number of subscribers	In million (population)
Call termination rates	Kenyan shillings
Total Local Mobile Traffic	Per minutes of use
Minutes of Use	Per subscriber
GDP	Kenyan shillings

4.2.1. Number of subscribers

This study looks at number of subscribers as customers using the voice service of the cellular network providers. Figure xx illustrates the trend in number of subscribers across the industry from the year 2009-2013. The illustration shows the percentage change in number of subscribers on quarterly basis. From the figure the number of subscriber fluctuates across the years under study. The percentage change in this number of subscribers is calculated from the data in appendix c. The subscribers change tremendously across the years depicting the industry to be regarded as dynamic. This shows that the industry constitutes the characteristic of the developed model that is intended to be used to measure the market share.

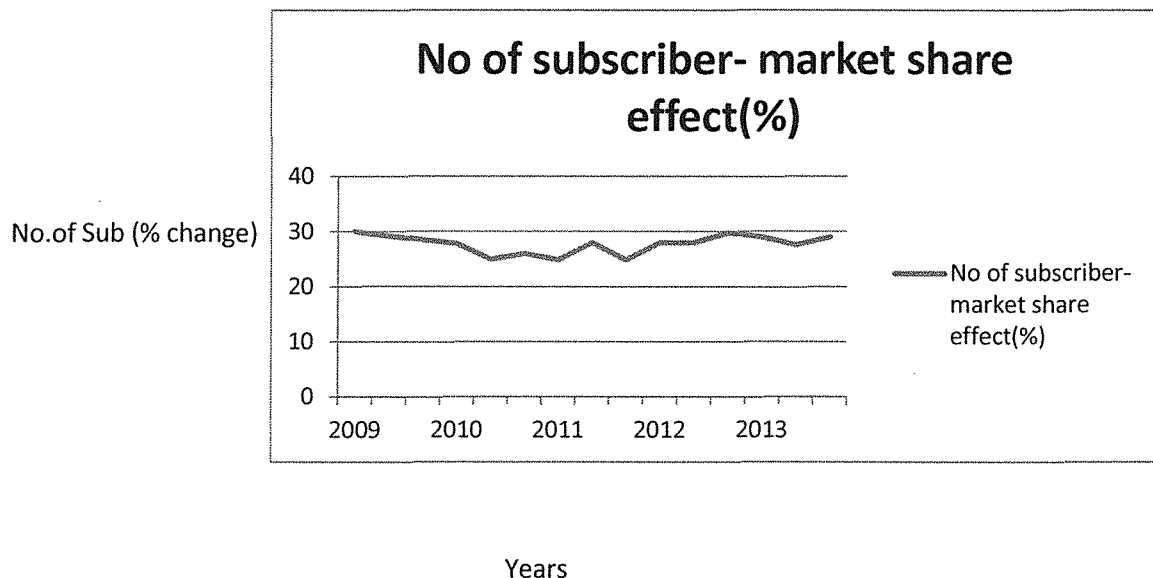


Figure 4. 1: Number of Subscribers on quarterly basis

4.2.2 Call Termination Rates

Call termination rates are changes upon terminating subscribers calls across the other network. With the advanced technology in place, subscribers tend to belong to more than one operator in the market, and they choose the operators based on how the products offered in the market benefits them. Call termination rates therefore affects the operators negatively or positively depending on how many subscribers terminate their calls across the other operators' network. Figure 4.2 shows the trend for call termination rates across the years under study and this is 2009-2013. The

percentage change in this rates is calculated from the data in appendix c. the trend also depicts the dynamism of the operators market.

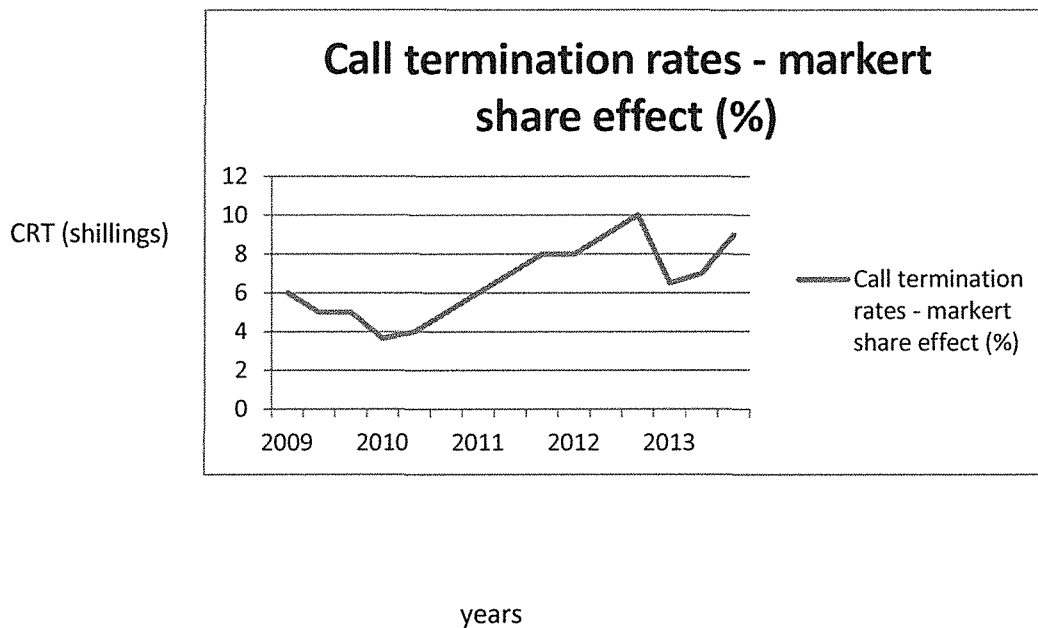


Figure 4. 2: call termination rates on quarterly basis

4.2.3 Total Local mobile Traffic

This study defines Total Local Mobile Traffic to be the space occupied by the operators subscribers on the spectrum. This defines who gets to control the network and creates congestion for other operators in the market. The more subscribers an operator has the more likely the bigger the spectrum the operator will occupy for the service. Figure 4.3 shows the behavior change in the Total Local Mobile Traffic across the different network from the year 2009-2013. The figure is generated from the data in appendix c; drawn on basis of after every four months. The percentage change in Total Local Mobile Traffic fluctuates, depicting the dynamism of this market.

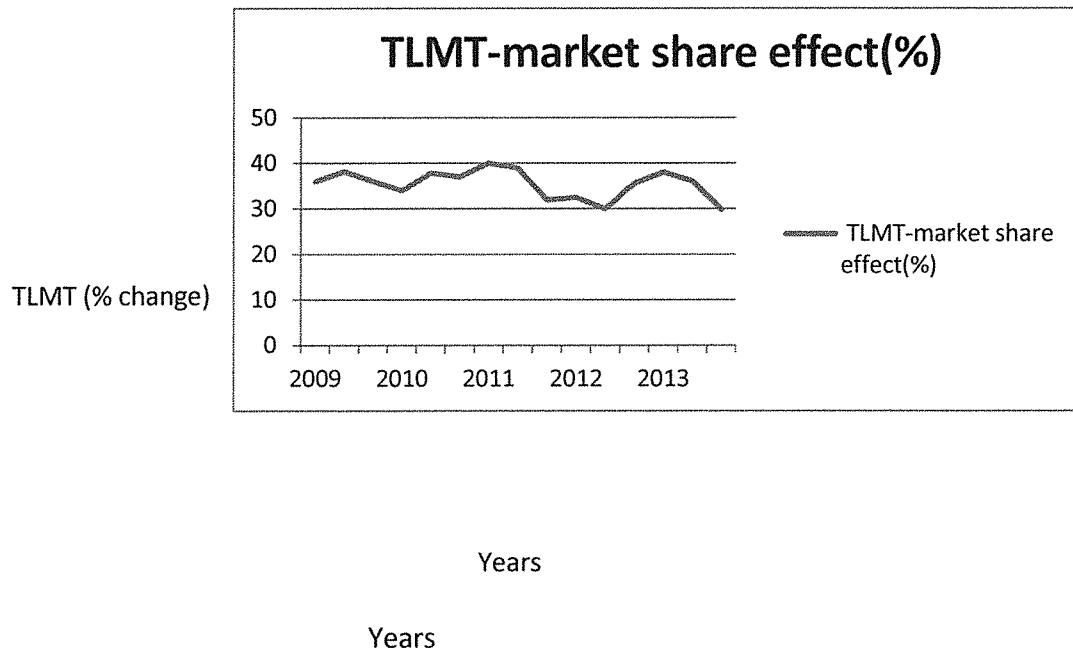
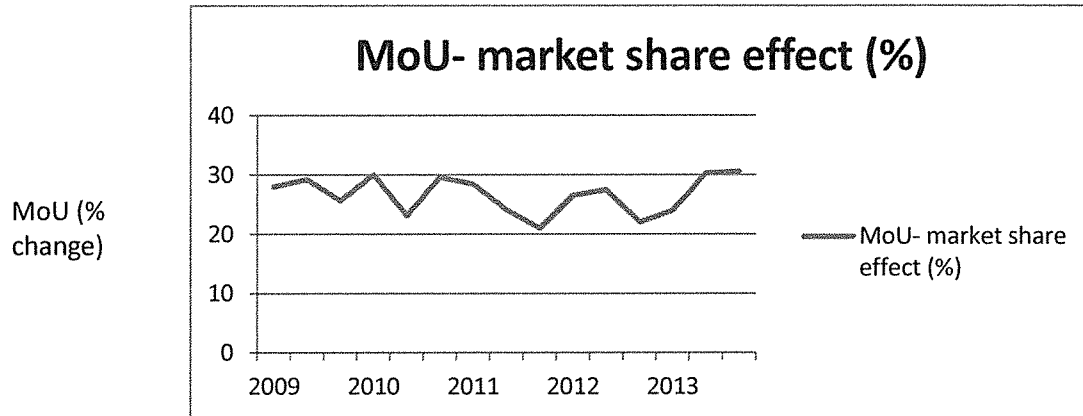


Figure 4. 3: Total Local Mobile Tariffic on quarterly basis

4.2.4 Minutes of Use

The study looks at the minutes of use in the context of those minutes spent on voice communication, and measured in minutes. The subscribers are charged per minute spent on communication. This minutes of use have been accumulated per every four months as shown in appendix c. its from this data that figure 4.4 is drawn to show the change and trend in minutes of use across the network from the period of 2009 to 2013. The trend clearly shows volatility in this minutes of use pausing a the market to be more dynamic. Different operators gather different minutes of use at different point of time. The figure illustrates the percentage change in this minutes in the industry.



years
Figure 4. 4: Trend in Minute of Use on quarterly basis

4.3 Effects of the determine factors on the UMTS market share

According to the reviewed literature, regulatory and market power has been a major influential factors on the market share. This study has considered the call termination rate as factor of regulatory given that it is a policy from the market regulators (CCK). The market power has been looked at in different perspective by considering market power factors in this market i.e. Minutes of Use and Total Local Mobile Traffic.

By looking at the effects that this factors have to each operator's market share a descriptive analysis was done where the mean and standard deviation was used to analyze the variability effect of each factors on the market share. The percentage deviation is generated to test the volatility of the observations. These factors are discussed individually in this chapter as shown below:

In calculating the standard deviation of sample of each factor the below equation was used

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2}$$

Where s is the standard deviation of the sample of a population

N is the total sample

x_i is the observation while $\bar{x}$ is the mean of the sample population

4.3.1 Minutes of use

Table 4.6 below shows the mean and standard deviation of minutes of use per operator, clearly illustrating their variability and indicating the distribution of the minutes of use. The standard deviation per operator shows the deviation of minutes of use from the mean, indicating that the variable does have an effect to the market share of all the operators. Therefore the minutes of use become a relevant variable to all operators' percentage market share.

The percentage deviation was calculated using the formula below:

$$\% \text{ deviation} = \frac{(\text{mean} + \text{deviation}) - \text{mean}}{\text{mean}} * 100\%$$

This percentage determines the volatility of the minutes of use. From the results shown in table 4.6, it clearly indicates that the minutes of use as an observation is volatile and its prediction cannot be determined by a mere observation hence suitable fitted in the logit model for prediction purpose. The variation of the minutes of use is explained by the % deviation across the operators.

Table 4. 2: Effect of Minutes of Use per UMTS operators' market share

Total Local Mobile Traffic		Safaricom Ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Mean	455327586	31398484.35	35897439.3	78483923.96
	δ	354825	2895476	245612	425617
	%deviation	0.599	0.654	0.742	0.748
2010	Mean	424437822.2	25786843.43	32670796.7	69084700.13
	δ	365891	254781	245789	321456
	%deviation	0.685	0.547	0.685	0.624
2011	Mean	384367931.2	30054783.65	36768021	78138158.83
	δ	412534	321456	214536	542142
	%deviation	0.658	0.692	0.721	0.691
2012	Mean	433581638.8	42791477.75	26174240.1	87274491.98
	δ	435016049.8	41626412.52	31599618.4	88513322.54
	%deviation	0.654	0.723	0.692	0.714
2013	Mean	438676248.4	45605609.33	30910683.27	88336092.67
	δ	457894	325641	321546	365241
	%deviation	0.652	0.589	0.634	0.712

4.3.2 Total Local Mobile Traffic

Table 4.7 below shows the mean and standard deviation of total local mobile traffic, clearly illustrating their variability and indicating the distribution of this total local mobile traffic. The standard deviation per operator shows the deviation of TLMT from the mean, indicating that the variable does have an effect to the market share of all the operators. Therefore the total local mobile traffic becomes a relevant variable to all operators' percentage market share

The percentage deviation was calculated using the formula below:

$$\% \text{ deviation} = \frac{(\text{mean} + \text{deviation}) - \text{mean}}{\text{mean}} * 100\%$$

This percentage determines the volatility of the total local mobile traffic. From the results shown in table 4.6, it clearly indicates that the total local mobile traffic as an observation is volatile and its prediction cannot be determined by a mere observation hence suitable fitted in the logit model for prediction purpose.

Table 4. 3: Effect of TLMT per UMTS operators' market share

Total Local Mobile Traffic		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Mean	6867944766	385552416.3	40854099	498148693.3
	δ	5847962	5326814	4325612	321546
	%deviation	0.72	0.645	0.721	0.685
2010	Mean	6683868834	330477867.7	39489183	452116034.7
	δ	453216	412356	321546	365892
	%deviation	0.592	0.642	0.663	0.621
2011	Mean	5922023291	449996364	54613311	587186087.7
	δ	4325169	423156	325146	312458
	%deviation	0.714	0.654	0.689	0.592
2012	Mean	5614662575	620580311.7	91273464.33	877345640.7
	δ	4125687	421587	326589	312457
	%deviation	0.548	0.653	0.712	0.698
2013	Mean	5812196353	584071191.7	103252703	860456891
	δ	457896	456879	365987	321456
	%deviation	0.685	0.587	0.548	0.598

4.3.3 Number of subscribers

Table 4.8 below shows the mean and standard deviation of number of subscribers per operator, clearly illustrating their variability and indicating the distribution of number of subscribers. The standard deviation per operator shows the deviation of number of subscribers from the mean, indicating that the variable does have an effect to the market share of all the operators. Therefore the minutes of use become an effective variable to all operators' percentage market share.

The percentage deviation was calculated using the formula below:

$$\% \text{ deviation} = \frac{(\text{mean} + \text{deviation}) - \text{mean}}{\text{mean}} * 100\%$$

This percentage determines the volatility of the number of subscribers. From the results shown in table 4.6, it clearly indicates that the number of subscribers as an observation is volatile and its prediction cannot be determine by a mere observation hence suitable fitted in the logit model for prediction purpose.

Table 4. 4: Effect of Number of subscribers per UMTS operators' market share

Total Local Mobile Traffic		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Mean	19649444.33	2383186.667	2918491	4543208.333
	δ	584796	578964	589743	458796
	%deviation	0.74	0.654	0.712	0.698
2010	Mean	19045051.67	1957255.667	2656162.333	3999114.333
	δ	5478921	5897463	5362514	4569871
	%deviation	0.594	0.587	0.632	0.612
2011	Mean	18676014.67	2281198	2989270	4523193.333
	δ	5784692	5421369	5214698	4987562
	%deviation	0.685	0.642	0.715	0.725
2012	Mean	19485601.33	3159500	2569074.667	5123781.333
	δ	5879461	5214789	52147896	49875621
	%deviation	0.689	0.654	0.632	0.698
2013	Mean	19649552	3461526.333	2513063.667	5113522
	δ	5487962	54321456	49875612	4865213
	%deviation	0.761	0.691	0.598	0.587

4.3.4 Call termination rates

Table 4.9 below shows the mean and standard deviation of minutes of use per operator, clearly illustrating their variability and indicating the distribution of the minutes of use. The standard deviation per operator shows the deviation of minutes of use from the mean, indicating that the variable does have an effect to the market share of all the operators. Therefore the minutes of use become an effective variable to all operators' percentage market share.

The percentage deviation was calculated using the formula below:

$$\% \text{ deviation} = \frac{(\text{mean} + \text{deviation}) - \text{mean}}{\text{mean}} * 100\%$$

This percentage determines the volatility of the call termination rates. From the results shown in table 4.6, it clearly indicates that the call termination rates as an observation is volatile and its prediction cannot be determine by a mere observation hence suitable fitted in the logit model for prediction purpose.

Table 4. 5: Effect of Call termination rates per UMTS operators' market share

Total Local Mobile Traffic		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Mean	12.33	10.67	9.83	9.33
	δ	4.25	5.21	3.85	3.56
	%deviation	0.78	0.726	0.689	0.654
2010	Mean	8.33	8.33	8.5	7.17
	δ	2.45	2.78	2.68	2.69
	%deviation	0.721	0.658	0.598	0.745
2011	Mean	6.67	6.67	6.83	5.17
	δ	2.12	2.31	2.65	2.42
	%deviation	0.698	0.574	0.598	0.654
2012	Mean	4.33	4.67	5.5	3.67
	δ	1.36	1.54	1.68	1.12
	%deviation	0.685	0.721	0.692	0.592
2013	Mean	3.07	3.5	3.27	2.03
	δ	0.98	1.01	1.02	0.89
	%deviation	0.712	0.682	0.645	0.712

4.4 Significance of the components of UMTS market share

Looking at the significance of Minutes of Use, Number of subscribers, Total Local Mobile Traffic and Call termination rates in measuring market share for the mobile operators, table 4.7 provides significance of these variables in market share measurement. Analysis by MoU suggests that it is a significant variable that directly influence the market share, although significant; the size of the Cramer's phi coefficient of .153 indicates that the difference in proportions across the operators is small. In addition to MoU other components; TLMT, Number of subscriber and GDP were significant. One of this components, TLMT. For every operator in this market between the year of 2009 to 2013 was less likely to have less than 40% of minutes used on the spectrum, this variable yielded a medium effect size of Cramer's phi coefficient of .359, which indicated this variable as a substantially distinguishing factor between the operators market share controlled.

Table 4. 6: Variables significantly associated with market share

Variable	Valid N	Pearson Chi-square Value	df	P-value	Cramer's phi	Direction of Association
MoU	146	3.403	1	.065	.153	(+)
CTR	137	17.677	11	.089	.238	(-)
GDP	146	4.952	1	.026	.184	(-)
No.of Sub	146	5.254	1	.022	.190	(+)
TLMT	144	8.185	7	.317	.359	(+)

Variables are statistically significant at the $\alpha = .10$ level, except Hpw0111.

4.5 Current way of measuring UMTS market share

It was found that the current way of measuring market share in UMTS market is by use of auction method. This method considers only number of subscribers as the base to determine the operator's market share. The table 5.1 represents trend in market share measurement per operator from the period 2009 to 2013. As technology advance this method becomes less and less effective and less reliable. Guyon and Nakil puts more effecty on using or considering more than one factor in measuring the market share, more so in a dynamic market like UMTS.

Table 4. 7: Market share per operator

Years		Before model	Before model	Before model	Before model
		Safaricom	Airtel	Orange	Essar
2009	Q1	81%	10%	6%	3%
	Q2	79.9%	8%	7%	5%
	Q3	79%	10%	8%	6%
2010	Q1	76%	12%	8%	4%
	Q2	78%	13%	7%	2%
	Q3	74%	14%	8%	4%
2011	Q1	77%	15%	5%	3%
	Q2	76%	18%	4%	2%
	Q3	73%	16%	8%	3%
2012	Q1	74%	14%	8%	4%
	Q2	72%	19%	7%	2%
	Q3	70%	20%	5%	5%
2013	Q1	71%	18%	8%	3%
	Q2	73%	17%	7%	3%
	Q3	71%	18%	8%	3%

Source: CCK statistical quarterly reports

This dynamism has paused a challenge on the regulator on how it determines the market share per operators. The model developed in this study considers MoU, TLMT, call termination rate and number of subscribers as components relevant in establishing market share for UMTS operators. The period of time here is after every four months for the years 2009 to 2013 and the output is generated to give the percentage effect of every component on the market.

4.6 Variables and Data stationarity

Documentation of the quarterly report by CCK on UMTS market share started in 2007, it based its statistics on number of subscribers, the penetration and the rate at which other factors affected market share increased dramatically. The variables have then been identified and entered into equation (1) as a dummy variable which has the value of zero for the years before 2009 and one for the years after. Data on Minutes of Use, Total Local Mobile Traffic, call termination rates and number of subscription were collected from CCK quarterly reports.

Stationarity of the data were checked with the Augmented Dickey Fuller test. The results are presented in table (5.2). This was to be able to use only those accumulated up to that given time and avoid biasness within the factors since the data on the factors fluctuates with time.

Table 4. 8: Test of Stationarity of the Data

Variable	ADF statistic	10% critical level
Y	-3.2	-2.98
TMLT	-3.05	-3.39
GDP	-3.74	-2.81
MoU	-4.51	-3.55
P_r	-3.07	-2.92

All the variable are stationary at $\alpha = 10\%$

4.7 Estimation of market share value using the developed model

The model output was generated at every given point in time, where the coefficient effect of every factor was generated, which later was converted to percentages to show the percentage effect of

every factor on the market share. This percentage effect fluctuates across the quarters and the operators.

4.7.1 Logit model estimates

The results of this analysis are shown in Table 5.3. In the table we include the estimated values of intercept and parameter β with corresponding t -statistic, log-likelihood value, and likelihood test statistic and odds ratio. Table 5.3 confirms strong contemporaneous relationship between the market share and the current value of all examined components. Values of all betas' estimates are negative; this confirms the common sense that the increasing value of the confidence indicator results in lower probability of no effect on market share. The highest measurement power is proved by the call termination rate; it outperforms both the total local mobile traffic and minutes of use; this fact is robustly confirmed by all evaluation statistics. Using call termination rates is possible to correctly *measure* about 80% of market share of the operators. Therefore the model considers factors for market share measurement. The output justifies the use of the factors in the estimation of the market share of the various operators in the market.

	CRT		TLMT		MoU	
	estimate	statistic	estimate	statistic	estimate	statistic
<i>(i) D = 1 at GDP growth & No. of sub are below average and first quarter of 2009</i>						
Intercept	44.3363	3,039***	12.6736	1,679*	25.3449	2,622***
Safaricom	3%	1%	28%	12%	15%	10%
Airtel	1%	1%	4%	12%	2%	10%
Orange	0.9%	1%	2%	12%	1%	10%
Essar	05%	1%	1.5%	12%	0.5%	10%
Beta	-0.4424	-3,078***	-	-1,735*	-0.2595	-2,657***
Log-likelihood	-22.2799	19,8836***	0.1298	3,2214**	-27.3035	9,8365***
			30.6110			
Odds ratio		0.6425		0.8783		0.7715
McFadden's R-squared		0.3085		0.0500		0.1526
Total % of correct forecast		81.30%		60.40%		62.50%
% of correct downturn forecast		68.42%		26.32%		42.11%
<i>(ii) D = 1 at GDP growth & No. of sub are below average and second quarter of 2009</i>						
Intercept	38.9602	2,897***	8.9184	1,224	15.3183	1,981**
Safaricom	5%	2%	22%	17%	15%	10%
Airtel	2%	2%	4%	17%	2%	10%
Orange	1%	2%	2%	17%	1%	10%
Essar	0.5%	2%	1.5%	17%	0.5%	10%
Beta	-0.3846	-2,917***	-0.0890	-1,236	-0.1545	-1,991**
Log-likelihood	-25.1770	16,1048***	-32.4330	1,5928	-30.9451	4,5686**
Odds ratio		0.6807		0.9148		0.8569
McFadden's R-squared		0.2423		0.0240		0.0687
Total % of correct forecast		79.20%		52.10%		60.40%
% of correct downturn forecast		69.57%		34.78%		56.52%
<i>(iii) D = 1 at GDP growth & No. of sub are below average and third quarter of 2009</i>						
Intercept	36.6893	2,945***		2,707***	16.6072	2,006**
Safaricom	6%	1%	24.1815	5%	14%	2%
Airtel	2%	1%	20%	5%	2%	2%
Orange	1%	1%	4%	5%	2%	2%
Essar	0.25%	1%	2%	5%	1%	2%
			2.75%			
Beta	-0.3683	-2,995***	-	-2,763***	-0.1722	-2,061**
Log-likelihood	-23.3863	16,7374***	0.2450	9,6884***	-29.2240	5,0621**
			26.9109			

Odds ratio	0.6919	0.7827	0.8418
McFadden's R-squared	0.2635	0.1525	0.0797
Total % of correct forecast	75.00%	68.80%	62.50%
% of correct downturn forecast	50%	38.89%	27.78%

Results for logit model k = 3 quarters 2010

	CRT		TLMT		MoU	
	estimate	statistic	estimate	statistic	estimate	statistic
<i>(i) D = 1 at GDP growth & No. of sub are below average and first quarter of 2010</i>						
Intercept	24.322	3,018***	12.2436	1,676*	15.3349	5,642***
Safaricom	3%	1%	18%	12%	12%	10%
Airtel	2%	1%	5%	12%	3%	10%
Orange	1%	1%	3%	12%	2%	10%
Essar	1%	1%	6%	12%	1.5%	10%
Beta	-0.4424	-3,078***	-	-1,735*	-0.2595	-2,657***
Log-likelihood	-22.2799	19,8836***	0.1298	-	-27.3035	9,8365***
			30.6110			
Odds ratio		0.6425		0.8783		0.7715
McFadden's R-squared		0.3085		0.0500		0.1526
Total % of correct forecast		81.30%		60.40%		62.50%
% of correct downturn forecast		68.42%		26.32%		42.11%

(ii) D = 1 at GDP growth & No. of sub are below average and second quarter of 2010

Intercept	18.9602	2,897***	8.9184	1,224	15.3183	1,981**
Safaricom	7%	2%	21%	17%	15%	10%
Airtel	1%	2%	3%	17%	2%	10%
Orange	2%	2%	1%	17%	2%	10%
Essar	0.75%	2%	0.5%	17%	0.5%	10%
Beta	-0.3846	-2,917***	-0.0890	-1,236	-0.1545	-1,991**
Log-likelihood	-25.1770	16,1048***	-32.4330	1,5928	-30.9451	4,5686**
Odds ratio		0.6807		0.9148		0.8569
McFadden's R-squared		0.2423		0.0240		0.0687
Total % of correct forecast		79.20%		52.10%		60.40%
% of correct downturn forecast		69.57%		34.78%		56.52%

(iii) D = 1 at GDP growth & No. of sub are below average and third quarter of 2010

Intercept	36.6893	2,945***	24.1815	2,707***	16.6072	2,006**
Safaricom	5%	1%	25%	5%	10%	2%

Airtel	1%	1%	3%	5%	2%	2%
Orange	1%	1%	2%	5%	2%	2%
Essar	0.5%	1%	0.5%	5%	2%	2%
Beta	-0.3683	-2,995***	-	-2,763***	-0.1722	-2,061**
			0.2450			
Log-likelihood	-23.3863	16,7374***	-	9,6884***	-29.2240	5,0621**
			26.9109			
Odds ratio		0.6919		0.7827		0.8418
McFadden's R-squared		0.2635		0.1525		0.0797
Total % of correct forecast		75.00%		68.80%		62.50%
% of correct downturn forecast		50%		38.89%		27.78%

Notes: * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Results for logit model k = 3 quarters 2011

	CRT		TLMT		MoU	
	estimate	statistic	estimate	statistic	estimate	statistic
<i>(i) D = 1 at GDP growth & No. of sub are below average and first quarter of 2011</i>						
Intercept	44.3363	3,039***	12.6736	1,679*	25.3449	2,622***
Safaricom	2%	1%	14%	12%	19%	10%
Airtel	2%	1%	2%	12%	5%	10%
Orange	1%	1%	1%	12%	2%	10%
Essar	1%	1%	1%	12%	2%	10%
Beta	-0.4424	-3,078***	-	-1,735*	-0.2595	-2,657***
			0.1298			
Log-likelihood	-22.2799	19,8836***	-	3,2214**	-27.3035	9,8365***
			30.6110			
Odds ratio		0.6425		0.8783		0.7715
McFadden's R-squared		0.3085		0.0500		0.1526
Total % of correct forecast		81.30%		60.40%		62.50%
% of correct downturn forecast		68.42%		26.32%		42.11%

(ii) D = 1 at GDP growth & No. of sub are below average and second quarter of 2011

Intercept	38.9602	2,897***	8.9184	1,224	15.3183	1,981**
Safaricom	2%	2%	22%	17%	15%	10%
Airtel	2%	2%	4%	17%	2%	10%
Orange	1%	2%	2%	17%	1%	10%
Essar	0.5%	2%	1.5%	17%	0.5%	10%
Beta	-0.3846	-2,917***	-0.0890	-1,236	-0.1545	-1,991**

Log-likelihood	-25.1770	16,1048***		-32.4330	1,5928	-30.9451	4,5686**
Odds ratio		0.6807			0.9148		0.8569
McFadden's R-squared		0.2423			0.0240		0.0687
Total % of correct forecast		79.20%			52.10%		60.40%
% of correct downturn forecast		69.57%			34.78%		56.52%
(iii) D = 1 at GDP growth & No. of sub are below average and third quarter of 2011							
Intercept	36.6893	2,945***			2,707***	16.6072	2,006**
Safaricom	6%	1%	24.1815		5%	14%	2%
Airtel	2%	1%	20%		5%	2%	2%
Orange	1%	1%	4%		5%	2%	2%
Essar	0.25%	1%	2%		5%	1%	2%
Beta	-0.3683	-2,995***		-	-2,763***	-0.1722	-2,061**
			0.2450				
Log-likelihood	-23.3863	16,7374***		-	9,6884***	-29.2240	5,0621**
			26.9109				
Odds ratio		0.6919			0.7827		0.8418
McFadden's R-squared		0.2635			0.1525		0.0797
Total % of correct forecast		75.00%			68.80%		62.50%
% of correct downturn forecast		50%			38.89%		27.78%

Notes: * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Results for logit model k = 3 quarters 2012

	CRT			TLMT			MoU	
	estimate	statistic		estimate	statistic		estimate	statistic
<i>(i) D = 1 at GDP growth & No. of sub are below average and first quarter of 2012</i>								
Intercept	44.3363	3,039***		12.6736	1,679*		25.3449	2,622***
Safaricom	3%	1%		28%	12%		15%	10%
Airtel	1%	1%		4%	12%		2%	10%
Orange	0.9%	1%		2%	12%		1%	10%
Essar	05%	1%		1.5%	12%		0.5%	10%
Beta	-0.4424	-3,078***		-	-1,735*		-0.2595	-2,657***
			0.1298					
Log-likelihood	-22.2799	19,8836***		-	3,2214**		-27.3035	9,8365***
			30.6110					
Odds ratio		0.6425			0.8783			0.7715
McFadden's R-squared		0.3085			0.0500			0.1526
Total % of correct forecast		81.30%			60.40%			62.50%
% of correct downturn forecast		68.42%			26.32%			42.11%

(ii) D = 1 at GDP growth & No. of sub are below average and second quarter of 2012

Intercept	38.9602	2,897***	8.9184	1,224	15.3183	1,981**
Safaricom	5%	2%	22%	17%	15%	10%
Airtel	2%	2%	4%	17%	2%	10%
Orange	1%	2%	2%	17%	1%	10%
Essar	0.5%	2%	1.5%	17%	0.5%	10%

Beta	-0.3846	-2,917***	-0.0890	-1,236	-0.1545	-1,991**
Log-likelihood	-25.1770	16,1048***	-32.4330	1,5928	-30.9451	4,5686**
Odds ratio		0.6807		0.9148		0.8569
McFadden's R-squared		0.2423		0.0240		0.0687
Total % of correct forecast		79.20%		52.10%		60.40%
% of correct downturn forecast		69.57%		34.78%		56.52%

(iii) D = 1 at GDP growth & No. of subare below average and third quarter of 2012

Intercept	36.6893	2,945***		2,707***	16.6072	2,006**
Safaricom	6%	1%	24.1815	5%	14%	2%
Airtel	2%	1%	20%	5%	2%	2%
Orange	1%	1%	4%	5%	2%	2%
Essar	0.25%	1%	2%	5%	1%	2%
			2.75%			
Beta	-0.3683	-2,995***	-	-2,763***	-0.1722	-2,061**
			0.2450			
Log-likelihood	-23.3863	16,7374***	-	9,6884***	-29.2240	5,0621**
			26.9109			
Odds ratio		0.6919		0.7827		0.8418
McFadden's R-squared		0.2635		0.1525		0.0797
Total % of correct forecast		75.00%		68.80%		62.50%
% of correct downturn forecast		50%		38.89%		27.78%

Notes: * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Results for logit model k = 3 quarters 2013

	CRT		TLMT		MoU	
	estimate	statistic	estimate	statistic	estimate	statistic
(i) D = 1 at GDP growth & No. of sub are below average and first quarter of 2013						
Intercept	44.3363	3,039***	12.6736	1,679*	25.3449	2,622***
Safaricom	3%	1%	28%	12%	15%	10%
Airtel	1%	1%	4%	12%	2%	10%
Orange	0.9%	1%	2%	12%	1%	10%
Essar	05%	1%	1.5%	12%	0.5%	10%

Beta	-0.4424	-3,078***		-	-1,735*	-0.2595	-2,657***
Log-likelihood	-22.2799	19,8836***	0.1298	-	3,2214**	-27.3035	9,8365***
			30.6110				
Odds ratio		0.6425			0.8783		0.7715
McFadden's R-squared		0.3085			0.0500		0.1526
Total % of correct forecast		81.30%			60.40%		62.50%
% of correct downturn forecast		68.42%			26.32%		42.11%
<i>(ii) D = 1 at GDP growth & No. of sub are below average and second quarter of 2013</i>							
Intercept	38.9602	2,897***		8.9184	1,224	15.3183	1,981**
Safaricom	5%	2%		22%	17%	15%	10%
Airtel	2%	2%		4%	17%	2%	10%
Orange	1%	2%		2%	17%	1%	10%
Essar	0.5%	2%		1.5%	17%	0.5%	10%
Beta	-0.3846	-2,917***		-0.0890	-1,236	-0.1545	-1,991**
Log-likelihood	-25.1770	16,1048***		-32.4330	1,5928	-30.9451	4,5686**
Odds ratio		0.6807			0.9148		0.8569
McFadden's R-squared		0.2423			0.0240		0.0687
Total % of correct forecast		79.20%			52.10%		60.40%
% of correct downturn forecast		69.57%			34.78%		56.52%
<i>(iii) D = 1 at GDP growth & No. of sub are below average and third quarter of 2013</i>							
Intercept	36.6893	2,945***			2,707***	16.6072	2,006**
Safaricom	6%	1%	24.1815		5%	14%	2%
Airtel	2%	1%	20%		5%	2%	2%
Orange	1%	1%	4%		5%	2%	2%
Essar	0.25%	1%	2%		5%	1%	2%
			2.75%				
Beta	-0.3683	-2,995***		-	-2,763***	-0.1722	-2,061**
Log-likelihood	-23.3863	16,7374***	0.2450	-	9,6884***	-29.2240	5,0621**
			26.9109				
Odds ratio		0.6919			0.7827		0.8418
McFadden's R-squared		0.2635			0.1525		0.0797
Total % of correct forecast		75.00%			68.80%		62.50%
% of correct downturn forecast		50%			38.89%		27.78%

Notes: * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Source: own calculation in the R software

4.8 Comparison of market share for the period 2009 to 2013 on quarterly basis

Table 5.2 gives the output of market share per operator as analyzed by the developed model. This output is generated on quarterly basis from the year 2009 to 2013. The coefficients of each variable are then converted to percentages in order to show the percentage of market share that each operator control at each given point in time. Therefore, this section extracts from the output the percentage market share and shows the comparison output of each operator. It articulates the percentages impact of each variable on the market share it accumulates on quarterly basis.

4.8.1 Safaricom Limited market share output

The comparison table 5.3 shows that the market share of Safaricom fluctuating as factors changes with time, the number of subscribers has a higher contribution though relative with the TLMT. The output results clearly articulates where the total percentage of market share is generated from, making the use of model more precise and clearly compared to the current way of measurement.

Table 4. 9: Comparison of the market share output for Safaricom Limited

Safaricom ltd		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
2009	Q1	81%	15%	28%	30%	3%	76%
	Q2	79.9%	12%	22%	28%	5%	67%
	Q3	79%	14%	20%	32%	6%	72%
2010	Q1	76%	12%	18%	28%	3%	61%
	Q2	78%	15%	21%	35%	7%	78%
	Q3	74%	10%	25%	38%	5%	78%
2011	Q1	77%	14%	19%	32%	2%	67%
	Q2	76%	7%	22%	30%	7%	66%
	Q3	73%	7%	22%	33%	7%	69%
2012	Q1	74%	10%	20%	30%	4%	64%
	Q2	72%	5%	25%	28%	5%	63%

Safaricom ltd		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
	Q3	70%	10%	20%	30%	4%	64%
2013	Q1	71%	10%	22%	28%	6%	66%
	Q2	73%	10%	20%	30%	7%	67%
	Q3	71%	8%	22%	32%	4%	66%

4.8.2 Airtel limited market share output

The comparison table 5.4 shows that the market share of Airtel limited fluctuates as factors changes with time, the number of subscribers has a higher contribution though relative with the TLMT. The output results clearly articulates where the total percentage of market share is generated from, making the use of model more precise and clearly compared to the current way of measurement.

Table 4. 10: Comparison of the market share output for Airtel Limited

Airtel ltd		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
2009	Q1	10%	2%	4%	5%	1%	12%
	Q2	8%	3%	5%	10%	2%	20%
	Q3	10%	2%	4%	7%	2%	15%
2010	Q1	12%	3%	5%	8%	2%	18%
	Q2	13%	2%	3%	6%	1%	12%
	Q3	14%	2%	3%	4%	1%	10%
2011	Q1	15%	2%	5%	9%	2%	18%
	Q2	18%	2%	4%	9%	2%	17%
	Q3	16%	3%	3%	8%	1%	15%
2012	Q1	14%	4%	4%	10%	2%	20%
	Q2	19%	4%	5%	10%	1%	20%

Airtel ltd		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
	Q3	20%	4%	5%	10%	2%	21%
2013	Q1	18%	3%	5%	9%	1%	18%
	Q2	17%	3%	3%	10%	2%	18%
	Q3	18%	4%	5%	10%	1%	20%

4.8.3 Orange Kenya market share output

The comparison table 5.5 shows that the market share of Orange Kenya fluctuates as factors changes with time; the number of subscribers has a higher contribution though relative with the TLMT. The output results clearly articulates where the total percentage of market share is generated, making the use of model more precise and clearly compared to the current way of measurement.

Table 4. 11: Comparison of the market share output for Orange Kenya

Orange Kenya		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
2009	Q1	6%	1%	2%	4%	0.9%	8%
	Q2	7%	1%	3%	5%	1%	9%
	Q3	8%	2%	2%	3%	1%	8%
2010	Q1	8%	2%	3%	5%	1%	11%
	Q2	7%	1%	2%	3%	2%	8%
	Q3	8%	1%	2%	4%	1%	8%
2011	Q1	5%	1%	2%	5%	1%	9%
	Q2	4%	1%	1%	6%	2%	10%

Orange Kenya		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
	Q3	8%	2%	3%	4%	1%	10%
2012	Q1	8%	1%	2%	5%	1%	9%
	Q2	7%	2%	1%	6%	1%	10%
	Q3	5%	1%	3%	3%	2%	8%
2013	Q1	8%	3%	2%	4%	1%	10%
	Q2	7%	2%	1%	6%	1%	10%
	Q3	8%	2%	2%	5%	1%	10%

4.8.4 Essar Telecom market share output

The comparison table 5.6 shows that the market share of Essar Telecom fluctuates as factors changes with time; the number of subscribers has a higher contribution though relative with the TLMT. The output results clearly articulates where the total percentage of market share is generated, making the use of model more precise and clearly compared to the current way of measurement.

Table 4. 12: Comparison of the market share output for Essar telecom

Essar telecom		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
2009	Q1	3%	0.5%	1.5%	2%	0.5%	4%
	Q2	5%	0.5%	1%	1%	0.5%	3%
	Q3	6%	1%	2.75%	2.75%	0.25%	5%
2010	Q1	4%	1.5%	6%	6%	1%	9%

Essar telecom		Without model share (%)	Using model to measure				
			MoU	TLMT	No. of Subscribers	Call termination rates	Total
	Q2	2%	0.5%	0.5%	0.5%	0.75%	2%
	Q3	4%	0.5%	2%	2%	0.5%	4%
2011	Q1	3%	1%	2%	2%	1%	6%
	Q2	2%	2%	3%	3%	1%	7%
	Q3	3%	1.5%	2%	2%	1%	6%
2012	Q1	4%	1%	3%	3%	1%	7%
	Q2	2%	2%	2%	2%	2%	7%
	Q3	5%	1%	4%	4%	0.5%	7%
2013	Q1	3%	1%	3%	3%	1.5%	6%
	Q2	3%	1%	2%	2%	1%	5%
	Q3	3%	1%	1%	1%	1%	4%

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

Use of one factor as a measure of market share for UMTS market is persistent in spite the availability of data on other influential factors. The major objective of this study was to identify the factors affecting the market share of the UMTS market in Kenya. The specific objectives included; identifying and determining the probability effect of each operator's market share with respect to the influential factors that is Total Local Mobile Traffic, Minutes of Use, Number of Subscribers and Call termination rates.

Using a cross- sectional method, secondary data (panel) was collected using indexing method from a sample of 4 operators. The mean, percentages and standard deviations were used to analyze the dispersion of the data proportion to market share per operators with respect to the factors. The results of the mean, percentages and standard deviations showed that MoU, TLMT, and Number of subscribers were significant in market share measure of the operators in the market. The results of the logit model showed that the MoU, TLMT, Number of subscribers were significant at 1 percent level of significance. Call termination rates was significant at 5 percent level of significance.

The literatures on the dynamism markets have shown that they tend to take the S shaped curve. By using logit model it can be shown that at each point in time how much is the effect coefficient, and consequently what should be the proper policy. Having considered the Kenyan market as dynamic and have seen the results take an S shape curve, this clearly shows that in this market more factors have to be considered to come up with an accurate and predictable market as well as good policy to govern the UMTS market.

Further the findings indicates that Total Local Mobile Traffic, Minute of Use, GDP and Number of subscription have a positive effect on the market share of UMTS market operators, while its call termination rates have had a negative effect. Comparing logistic model with the time series model discussed in chapter 2, it shows that the logistic model explains the role of effective factor in the dynamic market of UMTS and also can give us a better prediction than the time series models.

6.2 Conclusions

Based on the results of the mean, percentages and standard deviation, the conclusion is that there was a significant effect of TLMT, MoU, Call termination rate and Number of subscribers on the market share of the operators in the market. Also, the logistic model results, concludes that the factors of TLMT, MoU, Number of subscribers and Call termination rate significantly influenced the probability of effect on the market share of the operators in the market. The robustness checks confirm that the model enhanced by the customer confidence indicator forecast the GDP growth more accurately than the pure macroeconomic models. It is also robustly verified that MoU and the leading indicator do not enhance the VAR model forecasts significantly. The business confidence indicator brings mixed results: two tested sets of forecasts are worse than the macro model, but forecasts for the period 2010 Q3-2011 Q1 significantly overcome the benchmark.

6.3 Recommendations

Incorporation of more than one factor in market share measurement is important for the UMTS market which is a dynamic market and it should be encouraged to continue growing in future. Efforts need to be taken by the CCK to improve the measure of this market. Drawing from the conclusions of this study the following recommendations can be made:

The study showed that there is significant influence or impact of the MoU on the market share. This factor also significantly influenced the probability of market increase and decrease with time as the comparison of results shows. Therefore, the CCK should put more emphasis on incorporating MoU to produce accurate percentage of market share. However, this should not be done to discriminate those operators with lesser percentage.

The study also showed that there was a significant influence or impact of the TLMT on the market share. This factor also significantly influenced the probability of market increase or decrease with time as the comparison results shows. Therefore the operators should invest more time, effort and money on promoting use of their network among the relatively high income group who are more likely to use them. This is based on the fact that the more TLMT an operator accumulates the more market share you control and more profits you make, and the low income people might not be able to call more often.

The study also showed that there is significant influence or impact of number of subscribers on UMTS market share, with the effect being relatively higher on the operators with higher TLMT. This is because the users (number of subscribers) requires the network to operate on and the more the operators network is used the higher the accumulation of TLMT that operator makes. The operators should therefore aim to make its services as simple and easy to use as possible so that customers do not perceive them as being complicated or difficult to use. Also get a wider network to avoid the congestion on their network that will give them lesser TLMT by customers moving or preferring other networks of the competitor.

The study also showed that there is significant influence or impact of call termination rates. This factor is only beneficial to operators that control a higher percentage of the market because it's a factor that has a negative impact. The higher the call termination rates the lesser the minutes of use the lower the TLMT and more likely lesser percentage of market share an operator accumulates. Therefore, the CCK should revise the rates charged on the termination of calls across the networks; considering that it's a factor affecting the market share.

6.3 Areas of Future research

Area for further research could be considered on how beneficial the model can be on policy making by incorporating more factors like economic factors to get better prediction. Demographic factors can also be incorporated to identify the manner in which the market share behaves with regards to the demographic factors and customer preference.

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APPENDIX A: Research instrument

Table A. 1: Document Review Template

Data	Where to be retrieved
Minutes of Use	Sector statistical reports produced by CCK; minutes of use per operator
Total Local Mobile Traffic	Sector statistical reports produced by CCK; mobile service and usage pattern Results of the study impact of competition in the mobile voice market in the telecommunication sector and macro economy in Kenya published under research reports of CCK.
Call termination rates	Sector statistical reports produced by CCK; off net and own net chargers
Number of subscribers	Sector statistical reports produced by CCK; mobile subscription per operator.

APPENDIX B: List of Company in the sample

Table B. 1: List of Companies

Company	Preliminary data
Safaricom Ltd	MoU, TLMT, number of subscribers and call termination rates
Airtel	MoU, TLMT, number of subscribers and call termination rates
Essar limited	MoU, TLMT, number of subscribers and call termination rates
Orange Kenya	MoU, TLMT, number of subscribers and call termination rates

APPENDIX C: Data as retrieved from the quarterly reports

Table C. 1: CCK Quartely Reports on Minutes of Use

Minutes of Use		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Q1	455664381.6	33577027.68	37012212.9	82737869.68
	Q2	470252792.4	31825016.18	34310308.8	80945674.8
	Q3	440065584	28793409.2	36369796.2	71768227.4
2010	Q1	465552009	30468004.4	33882674.7	68884425.3
	Q2	415177443.6	20379735.58	33081612.6	71044612.2
	Q3	392584013.9	26512790.3	31048102.8	67325062.9
2011	Q1	371041055	21471152.58	33772134.6	72074513.15
	Q2	401522473.6	35040849.23	38409837.3	84890386.5
	Q3	380540265	33652349.15	38122091.1	77449594.85
2012	Q1	429113490.9	39568451.2	38059631.7	88344280.9
	Q2	442353019.6	42519308.6	30564983.4	89921194.73
	Q3	433581638.8	42791477.75	26174240.1	87274491.98
2013	Q1	439263931.7	44226485.6	28850683.2	88889669.9
	Q2	437284999.1	46281996	31339109	87557595
	Q3	439479814.5	46308346.4	32542257.6	88561013.1

Table C. 2: CCK Quarterly reports on Total Local Mobile Traffic

Total Mobile Traffic	Local	Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Q1	6,908,685,478	389,548,562	40,987,456	498,589,456
	Q2	6,912,584,562	398,524,123	39,589,154	500,215,368
	Q3	6,782,564,258	368,584,564	41,985,687	495,641,256
2010	Q1	6,859,584,568	342,641,523	39,564,754	452,589,456
	Q2	6,656,421,214	318,548,568	40,356,564	458,236,859
	Q3	6,535,600,721	330,243,512	38,546,231	445,521,789
2011	Q1	6,265,887,404	324,763,836	42,704,676	465,056,640
	Q2	6,001,456,123	435,546,356	58,678,912	667,823,156
	Q3	5,498,726,345	589,678,900	62,456,345	628,678,467
2012	Q1	5,374,911,010	674,886,538	77,320,342	878,166,892
	Q2	5,696,502,403	631,966,128	100,408,021	915,562,256
	Q3	5,772,574,311	554,888,269	96,092,030	838,307,774
2013	Q1	5,802,546,369	584,689,425	98,748,568	878,567,987
	Q2	5,786,453,234	579,865,698	105,546,689	846,345,789
	Q3	5,847,589,456	587,658,452	105,462,852	856,456,897

Table C. 3: CCK Quarterly reports on Number of Subscribers in millions

Number of subscribers in millions		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Q1	19,789,984	2,548,541	3,009,123	4,789,457
	Q2	19,512,564	2,415,561	2,789,456	4,685,712
	Q3	19,645,785	2,185,458	2,956,894	4,154,456
2010	Q1	19,895,385	2,312,562	2,754,689	3,987,521
	Q2	19,001,256	1,546,849	2,689,562	4,112,568
	Q3	18,238,514	2,012,356	2,524,236	3,897,254

Number of subscribers in millions		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2011	Q1	17,946,363	1,629,689	2,745,702	4,172,186
	Q2	19,006,981	2,659,647	3,122,751	4,914,060
	Q3	19,074,700	2,554,258	3,099,357	4,483,334
2012	Q1	19,221,209	3,003,298	3,094,279	5,113,996
	Q2	19,814,245	3,227,272	2,484,958	5,205,279
	Q3	19,421,350	3,247,930	2,127,987	5,052,069
2013	Q1	19,675,876	3,356,849	2,345,584	5,145,567
	Q2	19,587,234	3,512,865	2,547,895	5,068,457
	Q3	19,685,546	3,514,865	2,645,712	5,126,542

Table C. 4: CCK Quarterly reports on Call Termination Rates

Call termination rates in Kenyan shilling per termination		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
2009	Q1	15	12	10	10
	Q2	12	10	10	9
	Q3	10	10	9.5	9
2010	Q1	9	9	9.5	8
	Q2	8	8	8	7
	Q3	8	8	8	6.5
2011	Q1	7	7	7	6.5
	Q2	7	7	7	5
	Q3	6	6	6.5	4
2012	Q1	5	5	6.5	4
	Q2	4	5	5	3.5

Call termination rates in Kenyan shilling per termination		Safaricom ltd	Essar telecom	Orange Kenya	Airtel Ltd
	Q3	4	4	5	3.5
2013	Q1	3	4	4	2
	Q2	3	3	3	2
	Q3	3.2	3.5	2.8	2.1