



Norwegian University of
Science and Technology

Analysis Of ICT Policies And Regulations In The Mobile Sector In Kenya

Interpretive Study Of Mobile banking Service

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Master in Information Systems

Submission date: June 2011

Supervisor: Eric Monteiro, IDI



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Problem Description

The need to address convergence through ICT policy and regulatory framework is important as it is believed that adapting to convergence will expand access to ICT services and stimulate economic growth. The new ICT industry, therefore, requires new approaches to regulation that recognize the changed functions of telecommunications, broadcasting and media in this digital era. The mobile technology in Kenya has grown so fast just as the different applications and services offered with the mobile phone. These services would not have been possible if the correct policies and environment was not in place especially when we look at the m- banking (Mobile banking) service that is thriving so much.

However as the service has thrived and seen many innovations coming up due to this service the ICT policies in place have to be taken into consideration, for this reason this should be regulated to ensure as well that all partners are not exploited in the process. The Communication Commission of Kenya (CCK) is charged with the responsibility of ensuring that new players into the sector follow the standards that are kept in place and according to laid down policies. These regulations concern interconnection rates, consumer protection, tariff regulation, universal service obligation and funding as well as competition. As the industry grows offering diverse services so does implications of the regulation towards the whole mobile industry, the operators and the users at large.

The implications of the different regulations are:

1. To increase competition CCK reduced license operating costs to allow more players in the market that was initially a monopoly to now 4 players also the telecoms industry was liberalized.
2. Interconnection rates¹ were reduced which was very good for the consumers to access service cheaply but for operators some felt it was too low to operate and recoup on the expenses met. Low tariff charges translated to growth in mobile penetration in the country.

¹In August 2010 CCK reduced termination rates from KES.4.42 to KES 2.21 coupled with increased competition among the operators and this saw Airtel Kenya targeting the mass market as its strategy and having to have lowest voice call at KES.1 for on-net calls while the major player like Safaricom operating at the maximum cut out operating call charge tariff of KES.3.

3. Mobile Number portability(MNP) service was introduced in April 2011 helps customers to move freely from one network to another but still on net calls² are a lot cheaper than off net calls.Challenge with MNP is that the customer would not move with other services that maybe were very attractive for instance m-banking from one operator.
4. In management of spectrum and scarce resources CCK allowed licensee to share the spectrum and thus aiding in achieving the objective of offering universal access of service to all in the country and help small players in the market to expand their services to all parts of the country.Government removed levies on handsets leading to cheap and affordable access to mobile handsets to all increasing the usage.
5. Consumer protection is very important CCK and the whole mobile industry are required to educate the users on several risks that are associated with usage of the service and make them aware of what can be done if the rules are violated. Innovations come with risks here and there and consumers have to be made aware and in educating the customers CCK has the consumer education outreach program³.

Technological advances will still grow and for that new implications will follow and thus the regulatory body, operators and the users have to brace themselves with the changes that come along. As for CCK they should be able to predict the modifications accordingly and amend the policies in accordance as well.

Assignment given: 14 January 2011

Supervisor: Prof. Eric Monteiro, IDI

²On net calls are mobile to mobile calls within one operators' network while Off net calls are mobile to mobile calls to a different network operator.

³More on it can be found on the CCK website [HTTP://www.cck.go.ke](http://www.cck.go.ke)

Abstract

Mobile banking service usage has increased tremendously in the Kenyan market from the onset of the start of service in 2007 by Safaricom M-Pesa now all the mobile operators in the country have embraced the change and are all offering this service. A lot of research has been done on the rise of this service in Kenya and most notably by Olga in her PHD theses and others and they all have research on how thriving the service is majorly attributed to the adoption and acceptance of the service through ease of use e.t.c. It can be noted that any service like such require ICT in place.

Through use of ICT innovation in the mobile industry has grown especially with use of mobile phone to offer financial services in Kenya. Even though Kenya as a country is still lagging behind in other areas with growth and expansion of ICT when it comes to the mobile industry this is different and it is seen as a major leap to offering banking services without necessarily going to the bank. Understanding how the m-banking service is thriving and growing is far from just mere adoption and ease of use, with my thesis I try to analyze the challenges and opportunities that exist for the mobile industry in Kenya. I tackle m-banking service in particular and as can be noted no service can be allowed to operate without rules and regulations and as such what makes this service thrive if not the ICT policies in place and what strategies and practices employed by the mobile operators have worked for them.

The research presented here is an interpretative study of the 4 mobile operators in Kenya. To maintain the subscribers the operators have to be innovative enough to create value added services in line with the regulations in place.

Preface

This thesis is the result of the Computer and Information Science Master Thesis and was produced during the spring of 2011 that was written at the Department of Computer and Information Science (IDI) at the Norwegian University of Science and Technology (NTNU).

First and foremost I would like to thank my supervisor Eric Monteiro for great input and helpful guidance throughout the thesis, without his strong and firm guidance i would not have managed. He has been patient and understanding with all the work that has been put into this thesis and for being able to take me through the whole process.

I would also like to express my greatest thanks to my family for all the support and love accorded without them i would not have been able to attend NTNU and ultimately carry out my research work which i am gratefully thankful and for my daughter Jasmine for being an inspiration as i study. Finally I would like to thank my friends and colleagues at school and those who participated in the interview and dedicating their time to answer to my questions besides carrying out their work.

Thank you !

Trondheim 06/27/11

Sylvia Nasambu Wasike

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Chapter 1.

Introduction

This chapter outlines the context and motivation for the research presented in this thesis. I start off by discussing the motivation and the background for doing this research in addition to discussing the research method used. Finally at the end of the chapter i provide the structure of the thesis report.

1.1. Motivation and background

Mobile phone technology has changed the way people communicate and use the mobile phone for several services today from the days when it was specifically for voice services. In developing countries the phone is seen as a way of accessing ICT and fueling innovations that has seen the mobile subscription use increase as well. According to ITU statistics in 2010 it was even predicted that mobile penetration in developing countries would reach 68% by end of 2010 with main drivers being the Asia and Pacific region; India and China alone expected to add over 300 million mobile subscriptions in 2010. The African region penetration rates were estimated at 41% at the end of 2010 with a significant potential for growth. Even though the developed countries have reached saturation point with their penetration and growth the developing countries are catching up. The growth in developing countries can be attributed to factors such as:

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1. Privatization of the telcom industry which was mostly government owned allowing more players to come to the market. The regulatory bodies were also seen to be independent from the government workings.
2. Technological advancement such as use of wireless services to reach many even though not in all developing countries¹.
3. Market trends especially with the use of prepaid services which are ideal for most users to avoid burden that comes with postpaid services. Studying the market and being able to offer services that cater for the specific market is also a boost.
4. Ease of access to mobile phones that are now cheaply sold unlike the past when it was a luxury to own one.

Due to the above reasons the competition and market dynamics changed and in order to be able to offer services that are beneficial to the mobile phone users brought about creating innovative solutions. Earlier innovators with use of mobile phone technology were Bangladesh with a service to help solve health and agriculture problems; India with “mKrishi” messaging service to offer advise to farmers and also in Nigeria used to assist textile producers(Putnman(2009)[32]). Use of mobile phone for health services has really grown and according to Vatsalan et al. (2010) there are about 50 types being used in 26 developing countries². Of course use of mobile phone to access financial services was not left out Philippines with GCASH product was the first to offer this service as early as 2001 then we have South Africa WIZZIT and other countries followed suit like Kenya Sudan, Ghana, a number of countries in Latin America and Middle east ³

¹Use of Wireless technology can be seen in developing countries such as Chile, Colombia, Ethiopia, Guatemala, Kazakhstan, Peru, South Africa and Thailand.

²Vatsalan, D., S. Arunatileka, et al. (2010). Mobile Technologies for Enhancing eHealth Solutions in Developing Countries. eHealth, Telemedicine, and Social Medicine, 2010. ETELEMED '10. Second International Conference on.

³More can be found in CGAP website under the technology page. [HTTP:\www.cgap.org](http://www.cgap.org)

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Looking back the biggest market for mobile and mobile technology is in the developed countries but developed countries are catching up steadily especially when we look at the different mobile technologies that have driven the subscription levels as discussed above. When it comes to East Africa, Kenya is one of the country that has seen quite huge success and growth with the mobile banking service from its onset and thus this became my interest to understand this service more from operator's view. This m-banking service was started by Safaricom limited (Kenyan Mobile Operator) with the brand name M-Pesa in march 2007 in collaboration with the Vodafone UK having been funded by the Department for International Development (DFID).

To be able to use the service the user has to first be registered by the mobile operator at the retail agents shops and this service was specifically intended for use for sending and receiving money and buying mobile phone credit locally. However as at March 2011 the service has expanded to include the international market with IMT(International Money Transfer) in partnership with western union and as well you can use m-banking to buy goods, making payment for fees, access to bank accounts linked with the Equity bank Kenya, allowing organizations to make bulk payments to people disbursed in different parts of the country and of course we cannot forget to mention use of the service to book and pay for hotels(M-ticketing by M-Pesa). The m-banking service is offered by all the 4 mobile operators⁴ in the country all having different tariffs and incentive for their subscribers to use their service however Safaricom being the innovator and early adopter of the service has the largest subscriber base of 13.8 Million as at March 2011 with agent network of 26,948 countrywide and having cumulative transaction of (Kenya Shilling)KES.828 billion from inception of the service⁵.

When i look at the various research done previously on the usage and why the service has been a success in the Kenyan market and why it continues to soar mostly it leads to ease

⁴The four mobile operators are Safaricom Limited, Airtel Kenya, Orange Kenya and Yu. The respective m-banking service has a different brand name for each operator: Safaricom-M-pesa, Airtel-Airtel Money, Orange-Iko Pesa and Yu- Yu cash.

⁵Use of Safaricom statistics is just to show how the service has grown in the country but not to exclude the statistics from the other mobile operators offering the service. Statistics are from [HTTP://safaricom.co.ke/](http://safaricom.co.ke/)

of use, availability and convenience purposes among other reasons[60, 61, 62, 63, 69] and its usage is also seen as being transformational or made specifically to reach the unbanked population in the country⁶ which is not the case entirely. However to me i would see that for any innovation that comes with the mobile phone technology falls under the working conditions in the market and the ICT policies and regulatory framework in place. Mobile phone in Kenya is actually pushing the growth of ICT in the country to new levels and specifically i would like to analyze the regulations that affect m-banking service and what strategies mobile operators have employed to see that the service is still growing.

Kenyans are seen to have peculiar habits even the former CEO of safaricom Michael Joseph was quoted saying in 2006 “*Kenyans have peculiar calling habits*” this was when the network was jammed a lot over the weekend due to many calls made to Safaricom network then. Maybe to add to that peculiar habit i would say that many Kenyans do use the m-banking service as a compliment to their other means of accessing financial services available.

1.2. Objective of the study

The objective of the of the research is not to dispute the findings that have been found by the different researchers on the m-banking service in Kenya but to try and interpret the reasons as to why the service has grown in the country with the perspective from the regulations that are available. I do as well still use the findings gotten to understand more with the research questions that i would like to tackle and it is through the regulations existing and the ones that need to be reviewed that has seen the mobile operators changing their strategies in spirit of competition as well to have services that cater for all. The innovative spirit has to be governed with ICT in place and with this research i would like to answer these research questions:

⁶Morawczynski, O. and G. Miscione (2008). Examining trust in mobile banking transactions: The case of M-PESA in Kenya. *Social Dimensions Of Information And Communication Technology Policy*. C. Avgerou, M. Smith and P. van der Besselaar, Springer Boston. 282: 287-298.

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- *RQ1: What are the challenges and opportunities prevalent in the mobile sector in Kenya?*
 - *RQ1.1: What specific strategies and policies in place have helped the operators in the growth of the m-banking service?*
 - *RQ1.2: How do the operators handle challenges faced with the users in regards to the usage of the m-banking service?*
 - *RQ1.3: What are user experiences with the m-banking service and how can it be improved through the agents assigned in the field?*

The research is a case study of the mobile operators in Kenya and is interpretive in nature that relies on interview, observation exercise and use of documents. The interviews were not as expected as there was no response from two mobile operators but i believe the response from the two is a reflection of the others with certain aspects.

1.3. Structure of the thesis

The report is structured as follows:

- Part I comprising of chapters 2 and 3 discusses the literature study with beginning off with the history of mobile phone use and where it is now and in chapter 3 dealing with the standardization process that has seen the mobile technology grow. The standardization chapter will tackle 3G standardization in practice as well especially to those countries who were early adopters of the technology.
- Part II covers issues dealing with the mobile phone and IT in developing countries. Chapter 4 deals with the history and development of IT in developing countries highlighting the barriers to the growth and how to bridge the digital divide. On the other

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hand Chapter 5 covers mobile industry in developing countries.

- Part III deals with methodology and here i have chapter 6 that discusses the research method used for the study. The methods are interviews, observation and document analysis.
- Part IV is the case study and it it contains 2 chapters that is chapter 7 discussing about the mobile industry in Kenya, strategies and the legal and regulatory framework.
- Part V contains Chapter 8 will discussing the results of the research and Chapter 9 concludes teh work.
- Part VI is the Appendix. Appendix A you will find the interview guide and in Appendix B the interview transcriptions in full text.

Part I.

Literature Review

Chapter 2.

History of mobile industry

Mobile communication industry has seen a tremendous growth to meet the increasing demand for access capacity and due to the change in the fast paced technological development. This growth can be seen from the mobile phones that were being used in the early days to the different technologies that are part and parcel of our everyday life. Even though technological change force the growth of different mobile phones to support the new functionality and to keep up with the market trends, the ease of use is also a factor to the growth. From the statistics carried out the number of mobile subscribers has increased tremendously and it was estimated to be more than 5 billion people according to cellular news in October 2010[5].

In the statistics it was noted that Africa growth rate was still low at 4% between 1st quarter and 2nd quarter 2010 being attributed to the low mobile penetration and usage attracting Vodafone and Bharti to push for more accessibility of mobile phone usage. On the other hand developed markets continue to see growth in mobile subscribers being largely driven by the introduction of high-speed 4G data technologies such as WiMAX(Worldwide Interoperability for Microwave Access) and LTE(Long term Evolution). Some countries have even already started to offer 4G services at even higher broadband speeds moving to next generation wireless platforms; they include Sweden, Norway, Ukraine and the United States¹.

¹[HTTP://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf](http://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf)

Chapter 2. History of mobile industry

With the advent of different technological growth the different services offered by the mobile phone change from the basic use for the purpose of communicating mostly on voice to use of mobile devices to access internet for e-mail, instant messaging, text messaging and Web browsing, as well as work documents, contact lists. Modern mobile communications are based on a cellular concept that allows the carrying capacity of the mobile network to be considerably expanded by re-using frequencies in non-contiguous cells, thereby taking advantage of the scarce spectrum. There is also an automatic change of channel frequency during calls, which allows the user to move from one cell to another cell. However this was not the usual case as the mobile phone industry has changed and evolved to reach to where it is now. The evolution is as discussed below:

In 1956 Ericsson came up with an automatic mobile phone system known as MTA that did not require manual control. The phone weighed 40kgs and allowed calls to be made and received in the car while using the public telephone network system (Fransman,2003)[3]. This mobile phone system was restrictive to one cell area prompting more research to be done to enable flexibility with communication and to allow people to communicate while moving in different cell area. This feature known as “call handoff ” was invented by Bell labs in 1970s and it allowed mobile-phone users to travel through several cells during the same conversation. Through this invention the first mobile phone to be used in a non vehicle setting was invented by Motorola; the analog cellular systems based on IMTS(Improved Mobile Telephone service).

Further development led to the first generation(1G) mobile telephone being created in 1981;the Nordic Mobile Telephone System (NMT) created by Östen Mäkitalo and was used mostly in Sweden and Nordic countries. Östen Mäkitalo worked together with Jan Uddenfeldt who was Ericsson’s main GSM developer for close to 30 years[1]. NMT phones used analogue circuit-switched technology, with FDMA (Frequency Division Multiple Access) working on frequency bands of 800-900 MHz. It is noted as well that they were mainly for voice calls only relying on network of distributed transceivers to communicate with the mobile phones. These phones however had problems of slow traf-

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fic capacity, poor voice quality, and poor security[4]. FDMA-based cellular systems included the US-developed AMPS (Advanced Mobile Phone Service) and UK's TACS (Total Access Communications System) with communication with them only restricted to one country(Fransman,2003)[3].

Late 1980s saw the development of digital transmission of signals with use of time division multiple access (TDMA) leading to the replacement of the NMT and in came the second-generation mobile phones commonly referred as 2G. These GSM(Global system for mobile communication) phones came into existence in 1991 with the GSM standard being adopted in 1992. The standard was created as a joint venture of collaborative European work starting in the early 1980s which was aimed at creating a pan-European standard for digital mobile communications.Since GSM relied on the Scandinavian NMT standard, mobile companies from the Nordic countries such as Ericsson and Nokia benefited[1].

Principles used in a 1G system also apply to 2G in that they both use the same cell structure but signal handling is different as 2G phones had advanced features of caller identity and text messaging with signaling of frequencies by use of TDMA. In US they have a different system called D-AMPS (Digital Advanced Mobile Phone Services) based on TDMA technology, using the same 800-900 MHz bands as AMPS(Advanced Mobile Phone Services) systems. GSM became the globally accepted standard for digital mobile communication and it saw an immense growth in mobile subscriber base [6] to one million by 1994 with data and fax services being launched.Another group of 2nd generation services adopted code division multiple access (CDMA) as a more efficient way of increasing channel capacity. CDMA services were first introduced in Hong Kong and at the end of 1995 to the rest of the world.

By 2000 GSM introduced GPRS(General Packet Service) [6]which was prompted by demand for better data services and access to the internet. This saw the 2.5G mobile phones come into existence which were an enhancement of 2G providing high data rates speeds of 64-144 kbps enabling access to features like web browsing, the use of navigation and

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navigational maps, voice mail, fax, and the sending and receiving of large email messages. In 2003 EDGE (Enhanced Data rates for Global Evolution) was also used to increase the data rates.

Third generation (3G) mobile phones did not take long to be in the market and they came with enhanced services such as electronic commerce, mobile entertainment, car maintenance and security services with some even requiring data rates of up to 2Mbps. Though these phones were already in the market the 3G network services roll out was delayed due to several issues such as the long standardization process, expensive 3G infrastructure e.t.c more on it is discussed in the standardization chapter3. Since International Mobile Telephone 2000 (IMT-2000) which is the 3G standard supports both TDMA and CDMA, phones used in 2.5G technology could be used in 3G network[2].

3G technology in GSM uses W-CDMA(WidebandCDMA)based on CDMA technology; data is split into separate packets, which are then transmitted using packet switching technology. These packets are then reassembled in the correct sequence at the receiver's end using the code sent with each packet. Using W-CDMA the user gets very high-speed multimedia services for Internet access and videoconferencing however when several users were communicating it caused a problem with reducing the cell range so the cdma 2000 was invented[7, 4].

Now we have 4G technology an enhancement of 3G with improved and advanced services offered to users. It is expected to provide broadband, large capacity, high speed data transmission, providing users with high quality color video images, 3D graphic animation games, audio services in 5.1 channels. The security is also enhanced in the 4G mobile services[2].

2.1. Mobile operating systems

Mobile technologies have evolved and enable mobile phone users to use their phone for several services. To ensure that the different services and applications work seamlessly these phones are developed with an operating system(OS) which also determine third party applications that can run on the mobile device. Each phone type has an OS specifically created for it depending on the features offered and the manufacturer. The mostly used OS as discussed in[8, 9] are :

- Symbian OS: Designed for the specific requirements of 2.5G and 3G mobile phones. It is open source, royalty-free platform that can be used by anyone without restrictions.
- Windows Mobile: Devices available on both GSM and CDMA networks
- Blackberry software(Blackberry OS):Especially created for blackberry smart phones that caters for the smart phone applications to help you do more of what you love, to business software that connects you to business applications.
- Android: Based on modified version of Linux kernel
- Palm OS: Provides mobile devices with essential business tools, as well as capability to access the Internet or a central corporate database via a wireless connection. They have been on the decline in the recent years.
- Mobile Linux: Suitable option for higher-end phones with powerful processors and larger amounts of memory. It was first adopted by Motorola in 2003.
- Mixi: Existing full-fledged desktop and mobile applications written for Windows, Linux, Java, Palm that can be enabled immediately on mobile devices without any redevelopment. As such mixi allows interoperability between various platforms, net-

works, software and hardware components.

- Mac OS X Apple software (iPhoneOS): Created for the iPhone offering an easy-to-use interface, amazing features, and rock-solid stability. Other phones are trying to catch up on the technologies and features in iOS4(iPhone operating System).It is the software platform on top of which other programs, called application programs, can run on mobile devices such as mobile phones, smartphones, PDAs, and handheld computers

2.2. Mobile technologies

The rapid growth of wireless communication and portable devices in recent years has created a great potential for a variety of mobile services offered to its users. These services are only available through the different technologies that exist which has been necessitated by the need by carriers to offer faster Internet-access, multimedia and data-based broadband services, in addition to telephony. From the initial mobile phones that were used specifically for voice only, recently we see the mobile devices are used to offer very many services that one would get from the use of a PC. Commonly used mobile technologies are :

2.2.1. GSM Family Technologies

1. GSM: Open digital cellular technology used for transmitting voice and data services. It supports basic transmission of Short message Service(sms) with data transfer rates of 9.6kbits/s, it also allows international roaming thus users can access the same services as at their home country[6].
2. GPRS(General Packet Radio service): Allows mobile phones to remain connected to network and transfer requested or sent data instantly without disconnecting to check the mobile if in use. Accessing internet with GPRS,one's usage is charged for the

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amount of data sent and received unlike CSD(Circuit Switched Data) where one is charged for amount of time one is connected to the internet regardless of sending data or not [6, 13].

3. EDGE(Enhanced Data rates for GSM Evolution): Mostly used GSM technology that provides 3 times data capacity and throughput of gprs and thus enable downloading video, music clips,email and high speed color internet. It is also known as EGPRS(Enhanced GPRS) and cannot work as a stand alone without GPRS network. It works with new modulation techniques and channel coding that is used for both packet switched and circuit switched voice and data network[6, 13].
4. 3GSM/W-CDMA: GSM-based wireless services in use including 2.5G general packet radio service; 2.5G enhanced data GSM environment (EDGE);3G wideband CDMA (WCDMA) used in the Universal Mobile Telecommunications System (UMTS) and 3.5G High-Speed Downlink Packet Access(HSDPA) (Lawton,2005)[10]. Using 3GSM enhanced with W-CDMA mobile multimedia services such as music,TV and video rich entertainment content and internet access are offered. As of now 3GSM has been developed as an open standard in conjunction with the global operators and this has seen a huge growth in the use of this technology[6].
5. Mobile broadband High Speed Packet Access(HSPA):Software upgrade to 3GSM used by operators wanting to offer mobile broadband services to both the urban and rural communities. This technology allows simultaneous voice and data connections which are more secure and allow global roaming [6].
 - a) HSDPA uses a higher modulation rate, advanced coding, and other techniques to improve performance offering high speed internet access and rapid download of email with attachments.Access to mobile audio and full motion video is not interfered with. However its download speed only allow for applications that require one-way high speed communications such as Internet access but doesn't

support two-way high-speed communications such as videoconferencing(Lawton(2005)[10].

- b) HSUPA(High-Speed Uplink Packet Access) introduced in 2007 enables faster uplink speeds. The amount of data uploaded over mobile network was increased and thus increased user experience[6].
 - c) HSPA Evolved(HSPA+) launched early 2009 increased the data speeds offering a downlink speed of 42mb and 11mb in the uplink[6].
6. LTE(Long Term Evolution) enables data rates faster than mobile broadband HSPA and greater network capacity for network operators. It is based on air interface technology that incorporates Orthogonal Frequency Division Multiple Access (OFDMA) in the downlink and Single-Carrier Frequency Division Multiple Access (SC-FDMA) in the uplink. LTE is considered to be a next generation mobile technology solution[11].

2.2.2. CDMA

1. CDMA: Multiple transmissions are carried simultaneously by filling the entire communications channel with data packets coded for various receiving devices.Each voice or data call are assigned a unique code to differentiate from the other calls carried over the same spectrum and thus only received by the devices they are coded for .CDMA-based wireless services include the 2G CDMA One and the 3G CDMA2000 family of technologies operating at the 800-MHz or 1.9-GHz frequencies (Lawton,2005)[10].By using CDMA the spectrum capacity is increased and thus allowing all users to occupy all channels at the same time. CDMA2000 family include[11]:
 - a) CDMA2000 1X (IS-2000) supports circuit-switched voice upto and beyond 35 simultaneous calls per sector and high-speed data of up to 153 kbps in both directions. It was recognized by the International Telecommunications Union (ITU) as an IMT-2000 standard in November 1999.

- b) CDMA2000 EV-DO (Evolution-Data Optimized) introduces new high-speed packet-switched transmission techniques that are specifically designed and optimized for a data-centric broadband network that can deliver peak data rates beyond 3 Mbps in a mobile environment. We have CDMA2000 1xEV-DO (data only) and 1xEV-DV (data/voice) here as well.

2.2.3. Wireless Technologies

1. WiFi(Wireless Fidelity): Enables wireless connection between two or more devices for purposes of data sharing.It is based on IEEE 802.11 standards for wireless local access network and is widely used by many worldwide incorporating various devices not just mobile phones but also personal computers, laptops, PDA's, printers, cameras, games, mp3 players etc.[13]
2. WiMax and WiBro(Wireless Broadband): WiMax (worldwide interoperability for microwave access) technology based on the IEEE 802.16 standard is meant to deliver 4G performance.It is faster and uses orthogonal frequency-division multiplexing (OFDM) increasing capacity by splitting a data-bearing radio signal into multiple sets, modulating each onto a different sub carrier spaced orthogonally so that they can be packed closely together without interference and transmitting them simultaneously(Lawton(2005) [10].
 - a) 802.16d standard supports only fixed point-to-multipoint, metropolitan-area-network technology while the 802.16e offers the mobility aspect. WiBro is a Korean standard which is a Wimax variant mainly for broadband data with on-board devices support. According to the Korean company's Samsung WiBro allows handovers for up to 120 km/h and thus an alternative to mobile technologies of third generation (3G) UMTS[13].
3. I-Mode: It was developed by Japanese company NTT DoCoMo for providing wire-

less mobile Internet access to their subscribers majorly in Japan. I-Mode was one of the first methods used to browse internet on mobile phones using packet data transmission technique thus allowing subscribers to be charged for data transferred to mobile phone instead of the time they are connected[13].

2.2.4. Other technologies

1. 802.20: An IEEE effort led by Flarion Technologies and supported by Lucent Technologies and Qualcomm is a cellular standard based on Flarion's Flash-OFDM that could handle voice, multimedia, and data. IEEE 802.20 is a packet switched technology[10].

Chapter 3.

Standardization

Standardization has become a market and it causes a lot of challenges. The challenges can be attributed to the growth of different standards due to liberalization of the telecom industry, widespread of internet whereby anyone can set up services, success of mobile telephony and rapid technological developments. When it comes to definitions according to Van et al(1996)[14] he defines standardization as “*an agreement and recording properties, sizes and qualities of products and services. The Standards by which we measure the magnitude must also be fixed in order to make our agreements worthwhile*”. From his definition standards are thought of rules that govern the set agreements and are normally fixed. In Grotnes(2008)[16] he describes the different ways in which standards have been explained by different authors and they all reflect the role standards play in any given situation.

BSI (British Standards Institution), which is the oldest standards body in the world defines a standard as “*a published specification that establishes a common language, and contains a technical specification or other precise criteria and is designed to be used consistently, as a rule, a guideline, or a definition*”. From ISO perspective a standard is “*a guideline documentation that reflects agreements on products, practices, or operations by nationally or internationally recognized industrial, professional, trade associations or governmental bodies*”[18].

Immense definition of standards show that they are all related and talk about the same thing

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and i would say standards are formal guidelines that have to be followed to ensure consistent practices in doing things. The guidelines are not mandatory unless accepted by a particular organization. However since we are in a global market sharing of national economies and global commerce the need for internationally recognized standards that facilitate interoperability between people and organizations is required (Coallier,2001)[19].

Standards in telecommunication industry play an important role in the growth and functioning of infrastructures so the different parts can work together. These standards are created within the formal umbrella of the international telecommunication union (ITU) to the creation of standards done by a multitude of consortia (Grotnes)[16, 17].

As the telecommunication industry kept changing so were the different standards that came up to cater for the different services offered in an organized manner. Technology has changed from the one used in the early development of mobile systems to now NGN(Next Generation Networks) and as they emerge the standards as well evolve as new services require new practices of carrying them out in a consistent manner accepted internationally. In general the market change in telecommunication is an evolutionary process so does the standards.

Through standardization it is possible to establish and record a limited set of solutions to actual or potential matching problems directed at benefiting the party or parties involved and intending. With the solution it can be expected that they will be repeatedly and continuously used during a certain period by a substantial number of the parties for whom they are meant . The importance of standardization is two fold in telecommunication[14, 16]:

- Compatibility purposes-Technical specification or interfaces of products should be able to work together with other products.
- Quality standards- Describes the quality aspects of a product or process, aspects such as efficiency, safety,usability,maintainability e.t.c.

Standardization takes different forms and in telecommunication industry they are formal standards, recommendations through either general or specific consortium and defacto standards. All these focus on covering certain aspects in telecommunication [14, 16] see Table 3.1 for complete overview.

3.1. Standard Organizations

The standard organization are either international those adopted by an international standardization organization, European adopted by a European standardization body or national standard adopted by a national standardization body and made available to the public.

3.1.1. ITU-International Telecommunication Union

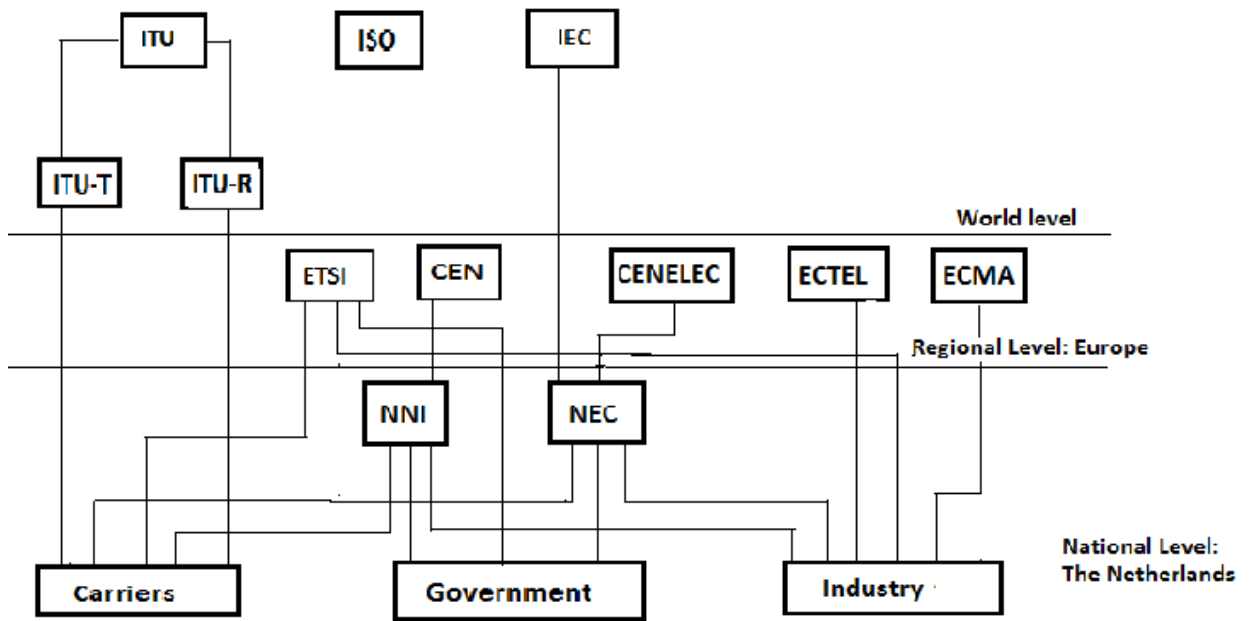
ITU is the world's most universally-recognized info-communications standards that dates as back as 1865; it's goal is to encourage international cooperation in order to arrive at an efficient telecommunications infrastructure. Initially ITU contained 2 organizations ITU-R and ITU-T but later on we see the emergence of ITU-D (ITU site)[21].

- ITU-T (ITU-Telecommunication Standardization Sector): Makes studies and recommendations in the field of wireless telecommunication covering aspects with core network functionality and broadband to next-generation services like Internet Protocol TV (IPTV). These recommendations are defining elements in information and communication technologies (ICTs) infrastructure. ITU-T was initially known as International Consultative Committee for Telegraphy (CCITT)
- ITU-R (Radio Communication Sector): Formally called Consultative Committee on International Radio (CCIR) Concerned with recommendations for global management of the radio-frequency spectrum and satellite orbits with objective to ensure in-

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interference free operations of radio communication systems. There are limited natural resources which are increasingly in demand from a large and growing number of services such as fixed, mobile, broadcasting, space research, emergency telecommunications e.t.c all these must be managed in an efficient way. The mission for ITU-R is to *“ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radio communication services, including those using satellite orbits, and to carry out studies and approve Recommendations on radio communication matters”*

- ITU-D(Development sector): This is a new sector in ITU which aims to facilitate and enhance telecommunication development through advice and direct technical assistance thus enabling access to infrastructure and information and communication services. ITU-D mission is:
 - *“Assist countries in the field of information and communication technologies (ICTs), in facilitating the mobilization of technical, human and financial resources needed for their implementation, as well as in promoting access to ICTs. Promote the extension of the benefits of ICTs to all the world’s inhabitants.Promote and participate in actions that contribute towards narrowing the digital divide.Develop and manage programmes that facilitate information flow geared to the needs of developing countries”.*



Source :Van et al(1996)[14]

Figure 3.1.: Standards organization.

3.1.2. ISO-International Organization for Standardization

It is the world's largest developer and publisher of International Standards consisting of national standards institutes of 163 countries, one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. The standards are reached through a consensus on solutions that meet both the requirements of business and the broader needs of society. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity © 2010 ISO[14]. Standards issued by ISO are made available after they have been revised severally as a Draft International Standard(DIS).

3.1.3. IEC -International Electrotechnical Commission

It issues reports, recommendations as well as provisional standards in the field of electrotechnology. The standards are internationally recognized and it supplements works done by ISO. Due to the growth and innovation changes in information Technology ISO and IEC have created a joint technical committee (JTC), ISO/IEC JTC1, Information Technology. This committee develops and maintains its own procedures, as well as collaborating with the ITU-T. The IEC also manages conformity assessment systems that certify that equipment, systems or components conform to its International Standards [14] Copyright © IEC 2010

IEC as well works with other organizations in the regional level to harmonize standards like CENELEC, EASC, ETSI e.t.c.

3.1.4. ECTEL, ECMA

ECTEL (European Conference of Association of Telecommunication and Professional Electronic industries) is an organization of European telecommunications manufacturers actively involved in standardization politics but doesn't participate in the standardization works. **ECMA** (European Computer Manufacturer's Association) on the other hand founded in 1961 is dedicated to establishing standards in the information and communications fields aiming to standardize ICT and consumer electronics (CE). ECMA is a liaison organization to ISO and is involved in JTC1 activities and recently it is known as Ecma-International having contributed to world-wide standardization in information technology and telecommunications. Ecma-international.

3.1.5. CEN,CENELEC,ETSI

CEN(Comité European de Normalisation) European Committee for Standardization that deals with the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electrotechnology (CENELEC) and telecommunication (ETSI). It provides European Standards and technical specifications. CEN has 31 national members who create voluntary European Standards (ENs) which are national standards in each participating country. © 2010 CEN It also works on the international level in agreement with ISO since 1991.

CENELEC(**European Committee for Electrotechnical Standardization**) created in 1973 is a technical organization under the Belgium law composed of the National Electrotechnical Committees of 31 European countries. CENELEC mission is “ *to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs*”© CENELEC

ETSI(**European Telecommunications Standards Institute**) Produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies even though they are created in the European level. It is recognized globally and by the European union as well . ETSI collaborates with IEC © **ETSI 2010**

- **Formal Standards**

Formal Standard Development Organizations (SDOs) operate at national, regional and international levels having national participation in the standardization process producing standards recognized by various organizations. These SDOs base their decisions through consensus, voluntarism, fairness and transparency to ensure openness in the process. Focus on formal standardization is on the core and access network.

- **General consortia based standardization**

IEEE and IETF are discussed to have a general scope because they have activities that cover a broader range not only mobile telecommunication. These two each have their own membership and their standards created have formal recognition and have some which are considered as formal standardization. IEEE produces wireless standards and has an impact on the access network, while IETF produces Internet standards and has an impact on the technical aspects of the core network. Open Mobile Alliance (OMA) is the largest mobile consortium making general specifications for new mobile services. Other general consortia that promote the use of new mobile networks are GSM Association (GSMA), CDMA development group (CDG), UMTS forum, Global mobile suppliers association (GSA) and Tele Management Forum (TMF) promoting the second and third generation of mobile technology.

- **Specific Consortia**

These are standardization organizations that focuses on specific activities mostly they focus on the peripheral parts of the infrastructure that is the accessories and the functionality of the user equipment. For instance the FLO Forum that promotes the FLO air interface specification focusing specifically on the access network and access methods. Other consortium include Bluetooth special interest group that specifies the Bluetooth specifications and the Infrared data association (IrDA) with both specifying short range wireless interface. Digital Video Broadcast group (DVB) focuses on digital and mobile TV and develops and promotes the DVB-H standard for sending broadcast media to the user equipment.

- **De Facto standardization:**

Driven by the market where manufacturers want to ensure that the equipment supplied works together with that from most suppliers. These standards are created by specific consortia with focus on specific user equipment. Most of the defacto standardization in the mobile industry are created for the different operating systems according to the mobile

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device thus there are few mobile defacto standards.

Shapiro et al (2001)[20] suggests a hybrid solution to standardization process due to the technological trends today that has seen telecommunications and information technology merging together. He goes further to explain that formal standardization process used throughout the evolution of the telecommunications industry may not be fully adequate thus need for a hybrid solution that works to encompass the positive aspects of traditional SDOs, market-driven consortia, and the international standard setting organizations in developing international telecommunications standards.

Grotnes[16, 17] recognizes as well how standards were developed in the past by international SDO with the standard being endorsed later by governments. Another way was development of standards through exclusive decision by the market without the intervention of SDOs or regulatory authorities then the market endorses the standard. However instead of using a hybrid solution he categorizes standardization process depending on the scope and type of standards. See Table 3.1

End-user services		OMA, GSA, TMF, CDG, GSMA, UMTF		
User equipment			IrDA, MCC, Bluetooth, MIPC, SMIA, SIMalliance Symbian, LIPS	Smartphone (Microsoft), Iphone (Apple), I-mode (NTT DoCoMo), Android (Google), Blackberry (RIM), T9
Access network	ITU-T	IEEE	Wimax, Wi-Fi, DVB, FLO Forum	
Management systems			OSGi, Parlay, MIPI	
Core network	3GPP, ITU-T 3GPP2	IETF		
Scope/type	Formal	General consortium	Specific consortium	De Facto

Source: Grotnes (2008) [16]

Table 3.1.: Standardization Activities by Scope and Type

3.2. Summary of mobile standards from 1G to 4G

Each generation of mobile communications has been based on a dominant technology which has significantly improved spectrum capacity. Each technology had a cellular standard that governed it ¹.

- **First Generation:**

1) Advanced Mobile Phone System (AMPS) was first launched in the US. It is an analog system based on FDMA (Frequency Division Multiple Access) technology with today being the most used analog system in US and the second largest worldwide.

¹[HTTP://www.itu.int/osg/spu/imt-2000/technology.html](http://www.itu.int/osg/spu/imt-2000/technology.html)

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2) Nordic Mobile Telephone (NMT) was mainly developed in the Nordic countries.

3) Total Access Communications System (TACS) was first used in the UK in 1985. It was based on the AMPS technology.

• Second Generation:

1) Global System for Mobile Communications (GSM) was the first commercially operated digital cellular system. ETSI was responsible for GSM standardization. GSM uses TDMA (Time Division Multiple Access) technology.

2) TDMA IS-136 is the digital enhancement of the analog AMPS technology. It was called D-AMPS when it was first introduced in late 1991 and its main objective was to protect the substantial investment that service providers had made in AMPS technology.

3) CDMA IS-95 increases capacity by using the entire radio band with each using a unique code (CDMA or Code Division Multiple Access). It is a family of digital communication techniques and South Korea is the largest single CDMA IS-95 market in the world.

4) Personal Digital Cellular (PDC) is the second largest digital mobile standard although it is exclusively used in Japan where it was introduced in 1994. Like GSM, it is based on the TDMA access technology.

5) Personal Handyphone System (PHS) is a digital system used in Japan, first launched in 1995 as a cheaper alternative to cellular systems. It is somewhere in between a cellular and a cordless technology.

• Third Generation: The ITU's IMT-2000 family

1) IMT-2000 contains the technical specifications for third generation systems offering a spectrum between 400 MHz and 3GHz . IMT-2000 is the result of collaboration of many entities, inside the ITU (ITU-R and ITU-T), and outside the ITU (3GPP, 3GPP2, UWCC

and so on) With IMT-2000 full interoperability and interworking of mobile systems was achieved offering the capability of providing value-added services and applications on the basis of a single standard. One of its key visions is to provide seamless global roaming, enabling users to move across borders while using the same number and handset

2) 3GPP(Third Generation Partnership Project) has participants from Europe, Japan, Korea and the US and bases the core network mainly on the GSM standard. Their 3G networks are often called UMTS or W-CDMA networks.

3) 3GPP2 with participants from the US, China, Japan and Korea bases the core network mainly on the IS-95/CDMAone standard. Their 3G networks are often called CDMA2000 networks

• **Fourth Generation and NGN(Next Generation Network)standards**

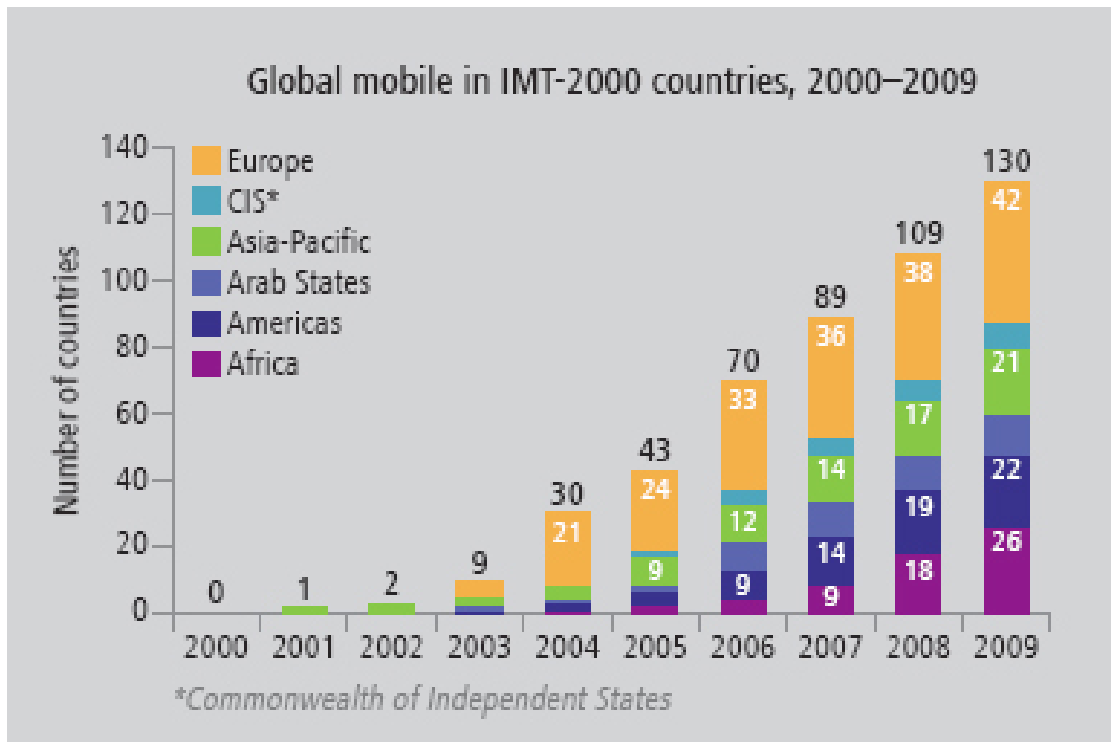
1) IMT-Advanced(2008) standard is an extension to the IMT 2000 and a recommendation of ITU–R M.1645 which aims to provide a global platform on which to build the next generation (4G) of mobile services with faster data access, unified messaging and broadband multimedia.

2) 3GPP Long Term Evolution (LTE) whose radio access is called Evolved UMTS Terrestrial Radio Access Network (EUTRAN) is a standard based on OFDM technology aligning with many IEEE 802 family standards, such as 802.16/WiMAX or 802.11/WiFi. The air interface of E-UTRAN is based on OFDMA (Orthogonal Frequency Division Multiple Access) and MIMO (Multiple-Input Multiple Output) in downlink (DL) and on SCFDMA (Single Carrier Frequency Division Multiple Access) in uplink (UL) direction(Berkmann et al,2008)[22]

3.3. 3G Standardization in practice

Standardization process is not always a straightforward task as it may be portrayed. Different countries either developing or developed adopt and reach agreements regarding this standards according to what suits them and the technology in place. Traditionally during the development of 0G up to until the 2.5G standards the internationally recognized bodies were the main players in the standardization process but this is not the case with 3G networks where the adoption is different in different countries. Haavisto (2000)[35] discusses how due to the fact that the 3G network was expected to deliver many new services the standardization environment for 3G systems changed with the convergence of different approaches to standardization, requiring the synergy of traditional standardization bodies, industrial forums and Internet related organizations. Even though at the end a good quality standard is achieved the process is lengthy and since the time to market for new products and services has reduced with having an informed and very curious market the industrial organizations cannot wait for the standardization bodies alone.

According to ITU news 3G use and its benefits has seen many countries(see Figure 3.2) join in the bandwagon even though the process is long and not straight forward if adopted correctly then the benefits are more. Japan and America were the largest individual 3G market but this was expected to change with Chinese market being on the spotlight to be watched.



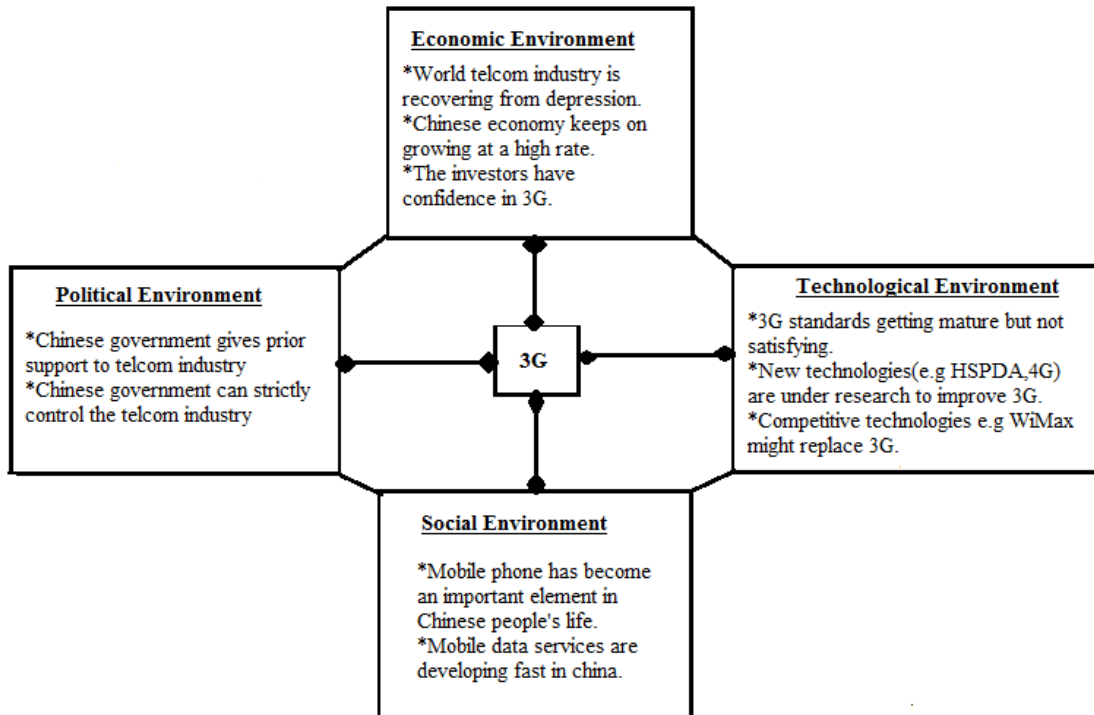
Source: ITU

Figure 3.2.: Global growth of countries with 3G commercial services.

3GPP and 3GPP2 is charged with production of a complete set of globally applicable Technical Specifications for the 3G system. In the next sections I discuss the standardization process in the 4 major organizational partners that is ARIB and TTC from Japan, CWTS from China, ETSI from Europe, T1 from the United States, and TTA from Korea

3.3.1. 3G in China and Hong Kong

China is the largest cellular market in the world and when it comes to the 3G market it is of no exception but the standardization process to offer 3G services took a long time. Since the inception of 3G services in 2000 China had been in discussions on how to adopt to the new technology. According to Jing (2007)[36] he has discussed how the implementation of the 3G adoption in China was affected by political, economical, social and technological aspects as depicted in the Figure 3.3 below.



Source: Jing(2007)[36]

Figure 3.3.: PEST analysis on 3G in China.

The political environment was mostly the government who control the telcom industry and favored the use of TD-SCDMA domestically created 3G standard for China, when it comes to economic issues the problem came due to the fact that the GDP of China was growing and at the same time the telecoms industry was evolving at a higher speed even though investors saw opportunity to invest in 3G this could not be the only reason to adopt it. Technology has been changing so fast and as such the speeds offered by 3G were seen as not too good enough to support the customer needs and thus the carriers were even preferring other technologies. The failure of 3G in Europe at the onset was also a factor here. The social factors are mostly driven by the market users of the different services offered by the mobile carriers. Due to all the factors that were affecting the 3G adoption in China it can be see that the deployment involved several parties the government, network operators,equipment suppliers,customers and Supplementary Product and Services Providers(Jing,2007)[36].

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Due to involvement of many parties in the decision making the 3G adoption was delayed but by October 2009 it was rolled out in the country with all the three standards being adopted. The country's largest cell-phone operator China Mobile had to adopt TD-SCDMA technology as directed by the government. Smaller carriers China Unicom and China Telecom adopted WCDMA and CDMA2000 technologies respectively. According to ITU 2010 statistics it was proven to be a feasible technology for commercial application and forecasted its achievement will be similar like the one in fixed telecommunications system manufacturing, and with the huge Chinese mobile market it would create a new growth economy for China. When it came to licensing of 3G in Hong Kong the process was open and transparent unlike in China that had so many interested parties².

By May 2010 China's 3G users had exceeded 20 million and it was estimated to reach 150 million by the end of 2011. The statistics showed that the first quarter of 2010, the China Mobile's TD-SCDMA network had covered over 238 cities, and its rival China Unicom, had covered 335 cities with its WCDMA network, while China Telecom covered 342 cities with its CDMA based network. The total number of 3G base stations as well stood at over 367,000 in number. By end of September 2010 they had 34.99 million subscribers and the number keeps growing^{3,4}.

Even though the adoption was a very long and slow process once deployed the 3G network continued to grow at a rapid state even more than how it was initially forecasted. China learnt from the mistakes made by the European market like lack of support for the market demand, the licensing bodies and regulatory body not aligned, spectrum allocation issues and also they took some time to introduce the technology gradually in the country.

²[HTTP://www.itu.int/osg/spu/ni/3G/casestudies/China/](http://www.itu.int/osg/spu/ni/3G/casestudies/China/). Accessed 11th November 2011

³Statistics sourced from:[HTTP://www.itu.int/ITU-D/ict/newslog/](http://www.itu.int/ITU-D/ict/newslog/)

⁴Trading markets news.[HTTP://www.tradingmarkets.com/news/](http://www.tradingmarkets.com/news/)

Hong Kong SAR

The 3G licensing was not a long process as was the case of China; the telecommunication industry is not state owned and thus when it came to licensing of 3G services the aim was to offer better telecommunication infrastructure for the local economy and the public. Hong Kong is more service oriented industry and as such it considered whether to adopt one standard or multiple standards in the IMT 2000 family. The issues that were of importance in the licensing were⁵:

- Choice of technical standards
- Policy objectives
- Allocation of radio spectrum -It was limited unlike in China
- Selection of the operators to be issued with the license to operate 3G
- Open network requirement

Office of Telecommunications Authority (OFTA) the regulatory body of Hong Kong awarded four 3G licenses in 2001 to :Hong Kong CSL Limited, Hutchison 3G (HK) Limited, Smart-Tone 3G Limited and Sunday 3G (HK) Limited .Late 2003 the 3G network was launched with services being rolled out in the first quarter of 2004⁶.

3.3.2. 3G in European Market

3G research began in 1990s by the European funded RACE(Research into Advance Communication in Europe) with the UMTS standard for Europe, second phase saw CODIT(Code Division Test Bed) and ATDMA(Advanced TDMA Mobile Access) develop 3G further based on WTDMA and WCDMA. The ACTIS(Advanced Communication Technology

⁵See more information on ITU 3G case study of China and Hong Kong SAR.[HTTP://www.itu.int/3g](http://www.itu.int/3g)

⁶[HTTP://www.cellular-news.com/story/10313.php](http://www.cellular-news.com/story/10313.php). Article published on 16th December 2003

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and Services) included the UMTS related project FRAMES (Future Radio Wideband Multiple Access)t to come up with WCDMA and WTDMA.

ETSI is the body responsible for the technical development of GSM and UMTS while the allocation of radio frequencies is done by European Radiocommunication Committee (ERC) of the European Conference of Postal and Telecommunication administrators (CEPT). In early 1998 ETSI selected Wideband CMDA as the technology for UMTS in the paired spectrum FDD(Frequency Division Duplex) and TD-CDMA for the unpaired spectrum TDD(Time Division Duplex). This standardization process was in parallel with the ARIB in Japan until end of 1998 when the 3GPP was formulated to allow for harmonization process (Eric et al,2007)[39]. Prior to acceptance of UMTS there were 5 proposals to the air interface each with different multiple access scheme(see Table 3.2). However a decision had to be made by ETSI on which to be adopted and it based its decision on:

- In the paired band (FDD-Frequency Division Duplex) of UMTS the System had to adopt the radio access technique formerly proposed by the WCDMA group.
- In the unpaired band (TDD-Time Division Duplex) the UMTS System adopts radio access technique formerly proposed by the TD-CDMA group.
- The ETSI Objective of providing low cost UMTS terminals to ensure harmonization with GSM and providing FDD/TDD dual mode operation.
- UTRA should support operation in a spectrum allocation as Small as 2 x 5 MHz but should aim to be designed for a broader spectrum allocation.

Concept Group	Multiple access scheme
Alpha	wideband code division multiple access (W-CDMA)
Beta	orthogonal frequency division multiple access (OFDM)
Gamma	wideband time division multiple access (wideband TDMA)
Delta	time divisional code division multiple access (TD-CDMA)
Epsilon	opportunity driven multiple access (ODMA)

Source: Richardson(2000)[37]

Table 3.2.: ETSI UTRA technology proposals

The different stakeholders that is the Mobile operators, equipment suppliers and policy makers involved in the decision making favored W-CDMA non existent technology in the market. Gandhal et al(2003)[46] points out that the reason why they favored WCDMA was *“possibly due to the fact that it would put them on even footing with CDMA 2G equipment suppliers and operators whereas CDMA2000 would give the latter a competitive cost and time to market advantage”*.

In 1999 the UTRA(UMTS Terrestrial Radio Access) was selected according to certain parameters such as pulse shaping, modulation chip-rate e.t.c and it was submitted to ITU trying to harmonize between the FDD/TDD modes and in November 1999 UMTS was adopted as a member of IMT-2000 favoring the W-CDMA. Richardson (2000)[37] describes UMTS as a *“revolution of the air interface accompanied by an evolution of the core network and with its handover and backward compatibility with GSM will ensure that both technologies coexist for many years”*. It offers operators additional capacity to support more subscribers (especially in urban centres) as well as greater speeds and ability to support new multimedia services focusing on the existing 2G networks. In 2003 the 3G services were introduced in Europe with a slow uptake by different mobile operators. Joakim et al(2003)[40] discusses some of the reasons for slow uptake as :

- High license fees for 3G network which could not be translated to the expected rev-

enue of its introduction

- Expected 3G market penetration
- Regulatory issues in different European countries
- Introduction of new technology so soon.
- Network sharing was not common which would have eliminated some of the costs in network roll out.
- High costs of achieving 3G infrastructure where some of the 3G services would not be deployed on the 2G infrastructure.

According to ITU the licensing method was also different there were countries which adopted the comparative bidding (beauty contest) method, and others chose auctions. This variations saw some countries like UK and Germany paying very huge costs to acquire a license while other countries like Finland awarded at no cost to the operators on the basis of comparative bidding. This shows how the European market had different market structure, pricing and service development which all affected the adoption also the reason to select a new technology was not all wise.

3.3.3. 3G in Korea

During submission of proposals for the 3G technology Korea's TTA submitted two wide-band CDMA proposals, one similar to cdma2000 and the other similar to ETSI's W-CDMA both based on wideband CDMA technology which is used in Korea as well as in Japan. The Korean government in 2000 awarded two 3G license by a comparative bidding system, these were awarded to Korea Telecom IMT(KT IMT) and SK based on W-CDMA technology because other providers; LG Glocom and Korea IMT-2000 Consortium failed to get the minimum total points or least partial points for IMT-2000 license (Myung et

al,2001)[41].

The third license using CDMA technology which is a continuation of QualComm’s 2G CDMA technology was to be awarded later in 2001 but none of the operators were keen to use it and even LG Telecom the third largest mobile operator had already opted out of the bidding process. The government through the Ministry of Information and Communication(MIC) opted to reduce the license fees for the CDMA 2000 that saw KTF(Free tel) and SK Telecom wanting to seek legal action. Eventually in July 2001 LG telecom in cooperation with other partners agreed to bid for the CDMA2000 license(ITU Korean 3G)[42].

From Table 3.3 it shows that Korea had infrastructure which was using CDMA2000 network technology so the transition to 3G was not such an uphill task to employ CDMA2000 technology but needed to upgrade, by May 2001 all operators had successfully deployed 3G(Yoo et al,2005)[43].

	1G IS-95a CDMA	IS-95b CDMA	CDMA 2000	1x CDMA 2000	1x EVDO
STK	July, 1988	January,1996 (World first)	August,1997 (World first)	October,2000 (World first)	November 2002
KTF	April 1984	October 1997	July,1999	May,2001	May,2002 (World first)
LGT	N/A			May,2001	N/A

Source: Yoo et al(2005) [43]

Table 3.3.: Evolution of Korean Wireless Service Operators.

The key stakeholders who shaped the 3G adoption in Korea were mainly:

- Technology regime-Equipment manufacturers(Samsung Electronics & LG Electronics), operators, Value added solution providers.
- Market - Consumers and Mobile operators
- Regulatory bodies-Government, International standardization bodies(3GPP,3GPP2)

and domestic standardization bodies(TTA, KWISF)

All the stakeholders were guided by the existing CDMA2000 standards and by involving all of them saw the success in the deployment and use of 3G services in Korea. They all had a common goal of becoming the world leader in IT by promoting competition in IT industry and by setting up their home-grown technology as global IT standards and thus worked together on settling on standards, policies, and business models that would enable them reach their goal. 3G was also introduced even when the market needs were uncertain but the aggressiveness nature of the stakeholders especially the government and network operators saw that it was implemented. Much of its growth is attributed to the use of CDMA2000 technology but less with the WCDMA which required new infrastructure to be acquired(Shin,2008)[45].

3.3.4. 3G in Japan

Japan's Association of Radio Industries and Businesses (ARIB) standardization body established the country's IMT-2000 Study Committee with the role of studying the air-interface technologies for IMT-2000. The stakeholders in the study committee was huge about 90 companies including Mobile operators (NTT DoCoMo, KDDI and J-Phone) and manufacturers(NEC and Fujitsu). They each proposed various IMT-2000 systems which were then compared, merged and harmonized with foreign standards organizations. W-CDMA was accepted by Japan's Telecommunication Technology Council(TTC) and was proposed to ITU in 1998. The Table 3.4 shows how the 3G process evolved in Japan and it can be noted that the process was not so complicated. The main licensing method was comparative method and since there were only 3 bidders the process was easy.

As well all the stakeholders were involved in the decision making process raising their concerns whenever a decision was made. The main reason for the 3G use was majorly due to the demand for multimedia services, international roaming and the lack of fre-

Chapter 3. Standardization

quency that was not able to sustain the increasing number of subscriber base. The three operators all used the CDMA technology with NTT DoCoMo and KDDI based on DS-CDMA(Wideband CDMA) while J-Phone based on MC-CDMA(cdma2000). However decision to select which technology was discussed and 20 stakeholders proposed the use of W-CDMA to roll out 3G⁷.

Jul. 1998	MPT released Basic guideline for public comment.
Nov.1998	MPT released the results for public comment
Mar.1999	TG8/1 approved draft key characteristics recommendation
Sept.1999	MPT received Report from TTC on Technical Conditions
Nov.1999	TG8/1 & SG8 approved draft radio interface recommendation
Dec.1999	MPT publicized Principles on Radio Station Licenses and consulted with RCC on Amendment of Related Ministerial Ordinances
Feb.2000	MPT publicized its draft licensing policies and requested public comments on them
Mar.2000	MPT established technical regulations and publicized its licensing policies
April-May 2000	License Application Period
June. 2000	MPT licensed 3 operators (NTT DoCoMo, KDDI, J-Phone)
Oct.2001	Commercial services to be launched in Japan (NTT DoCoMo Oct. 2001, KDDI Sept 2002, J-Phone June 2002)

Source: ITU

MPT :Ministry of Posts and Telecommunications

TG: Technical Group

SG: Study Group

Table 3.4.: Road to 3G licensing in Japan

⁷ITU Japan Case study on 3G: [HTTP://www.itu.int/osg/spu/ni/3G/Japan](http://www.itu.int/osg/spu/ni/3G/Japan)

3.3.5. 3G in US

While European market settled for the UMTS standard based on W-CDMA for the 3G roll out the US thought otherwise; for instance US firm Qualcomm which had no significant revenue in Europe favored a different standard which appealed to both US and EU regulators. Qualcomm has helped in the development of the CDMA-2000, WCDMA, and LTE cellular standards.

The standardization process in US began in May 2000 with stakeholders from the National Telecommunications and Information Administration(NTIA) within the commerce department, government and industry representatives. They held talks on which frequency bands to be selected based on 3 principles(Yazbeck,2003)[53]:

- Government had to choose spectrum from any one or all of the bands identified for 3G mobile wireless.
- Government had the flexibility to identify spectrum if and when they choose.
- No specific technology was to be identified for 3G services.

These frequency bands were already in existence in the American market being used for cellular and mobile services, by the DOD(Department of Defence) and for instrumental TV and wireless data. October 2000 call for spectrum auction was necessitated by the then president who set out that the auction should be done by September 2002. The concerned stakeholders; commerce department,DOD and Federal Communication Commission(FCC) started talks with FCC initiating the Notice Proposed Rule Making (NPRM)where all the parties gave their input and comments even the technical experts from different companies. By July 2002 spectrum to be allocated for 3G was announced by NTIA; 90 MHz of spectrum was to be allocated in the 1710-1755 MHz band, and a matching 45 MHz from the 2110-2170 MHz band.

FCC was charged with the issuance of the license for 3G services but US did not immediately launch. The mobile operators studied the market and decided to educate the market to create awareness of high speed mobile data connection instead of introducing the new technology to the market. When it came to auctions the mobile carriers could bid for specific markets unlike in Europe they had to bid on the UMTS standard. The license costs were also high in US with carriers having to pay up to \$90 billion leaving them heavily burdened.

When it came to adoption of 3G services in US the mobile carriers apart from educating its customer base decided to as well experiment with other technologies that were developing such as the WiFi and even offering Hot-Spot services in public areas such as cafes or even airports. Another issue that arose with the issuance of spectrum was that it was scarce and this was being issued to different bodies working on specific frequencies and the unallocated frequencies were held by either NTIA or FCC(Tilson et al,2006)[54].

The U.S allowed several competing technologies that is CDMA, GSM, and TDMA to operate but for 3G the most commonly used is the cdma2000 and W-CDMA which is similar to the UMTS in Europe(Zhang et al ,2005)[55]. AT&T Wireless upgraded its technology to 3G in July 2004, to become the U.S's first 3G voice and data network in San Francisco, Seattle, Phoenix, and Detroit and extended 3G services (in September 2004) in Dallas and San Diego⁸.

3.4. Reasons for wider 3G uptake

Even though the acquisition of 3G services was an uphill and is still an expensive affair the benefits once deployed is great. These reasons that drive more subscribers and operators to invest and use 3G services as discussed by ITU are ⁹:

⁸More on different operators in USA and the technology they use visit [HTTP://www.umtsworld.com/industry/usa.htm](http://www.umtsworld.com/industry/usa.htm)

⁹Information sourced from the individual 3G case studies from ITU

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1. It is a wireless service and thus avoids the need to install cable drops to each device. This in turn represents significant cost saving whether the service is within a building, home or a metropolitan area and as well it increases the penetration of network infrastructure to all parts of the country since due to scarce resources laying out cables would be an expensive task.
2. Wireless infrastructure may be deployed more rapidly than wireline alternatives to respond to new market opportunities or changing demand.
3. The mobility aspects offered by 3G services where one stays continuously connected over wider serving areas has facilitated its growth. Unlike use of wireline technologies this was not easy due to massive cabling required.
4. In comparison with other wireless technology of WiFi; 3G offers wireless services to a wider area coverage using much narrower bandwidth with support for rapid movement. WiFi offers these at higher bandwidths but the coverage areas are normally local within mostly cafes and airports.
5. Support for broadband data services at high speeds even though WiFi data rate speeds are higher at 11Mbps they are normally locked to a specific area.
6. Subscribers are now able to access real-time voice, data and streaming media with the support of the broadband and with support of “always on” connectivity effect drives the subscription levels high. The high penetration translates to higher revenue generation for the operators and help to ease the debt incurred in acquiring the spectrum license. Also videoconferencing and e-commerce is enhanced.
7. 3G spectrum acquisition is licensed and as such it is exclusively owned by the particular service provider and it eliminates the problem of service interference from other service providers and in the end able to manage congestion to the network that would normally occur when many users are connected on the network.

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8. WiFi, based on the 802.11b wireless Ethernet standard that supports wireless Local Area Network(WLAN) this could be used as a complement for 3G to offer more services at higher bandwidth as data content being downloaded on mobile phones keep increasing.
9. The accessibility of interesting content by mobile phone users still drives the growth of 3G as it can be seen it was not all about technology that drove users to 3G it was the availability of such heavy web based content access that made many to subscribe. Many applications are supported on 3G.

What next after 3G seems to be the talk in the mobile wireless industry now. The market demand for faster wireless services has grown so much recently that now there are other wireless technologies such as the WiMax based on 802.16 IEEE standard. WiMax is riding on the success offered by the WiFi but it does want to extend the access to a wider geographical area unlike the concept of a “Hotspot”. This technology is expected to offer very high data rates that would ensure that services such as 3D gaming are also made available to mobile users. The advent of this technology evolving to the OFDMA is ideal to the deployment of 4G services. According to ITU facts and figures 2010, 4G services are now being offered in countries such as Sweden, Norway, Ukraine and United States (Lehr&McKnight,2003)[56]. Most developing countries adopting 3G having studied the experiences from the European market are keen not to repeat the same mistakes that especially were encountered in the European market. The license fees is still so high so careful planning should be approached in its roll out so that benefits are realized and explored fully.

Part II.

IT and Mobile Industry In Developing Countries

Chapter 4.

IT in developing countries

IT (Information technology) often referred to as ICT (Information and communication technology) regards to ways of disseminating information through the use of technology. IT has tremendously expanded over the last three decades making the access to right information at the right time feasible ensuring the success of an individual, organization or culture. Use of ICTs is important for economic and social development and today the Internet is considered as a general-purpose technology and access to broadband is regarded as a basic infrastructure, in the same way as electricity or roads[23] . By improving access to information and by enabling communication, ICT can play a role in reaching the 8 Millennium Development Goals(MDG)¹:

- Elimination of extreme poverty
- Combating serious disease
- Achieving universal primary education
- Promoting gender equality
- Reduce child mortality
- Improve maternal health

¹More on MDG visit : [HTTP://www.itu.int/ITU-D/ict/mdg/](http://www.itu.int/ITU-D/ict/mdg/)

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- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

In order to make the most out of this exciting revolution one must be in a position to afford and completely comprehend what is offered by this technology. In developed countries they have realized the potential or value of ICT having tried to reach the MDG and this differs in the developing countries which are yet to achieve this however we see that the trend is changing. According to the ICT facts and Figures 2010 by ITU [12] it is estimated that 71% of the population in developed countries are online with only 21% in developing countries. They however anticipate that by the end of 2010, Internet user penetration in Africa would reach 9.6%, far behind both the world average (30%) and the developing country average (21%).

When it comes to connecting homes with the internet the statistics show still low internet growth in developing countries as in the developed countries in contrast to the rapid growth in the mobile sectors. In developing countries only 22.5% have a computer and only 15.8% have Internet access and in developed countries it is 71% and 65.6% respectively².

These statistics show that the access to IT and its usage is not growing as fast as it should in developed countries and this brings out the most common problem of the digital divide that has coupled the growth of ICT globally but mostly the developing countries[27]. Digital divide is viewed as a distinction between those who have both the access and skills needed to take advantage of IT technology, and those who do not. Another issue would be as developing countries adopt ICT use they still question the use of it in the development of the economy and yet the resources are limited to even cater for the wider population.

²ITU Telecommunication/ICT
D/ict/material/FactsFigures2010.pdf

Indicators database: [HTTP://www.itu.int/ITU-](http://www.itu.int/ITU-)

Development focuses both on local and global issues and to be able to tackle these knowledge is required. Local knowledge is important in this context, but there is also an abundance of outside knowledge that can be used to accomplish a variety of development goals. Another important aspect to development is to facilitate communication between different groups; knowledge coupled with communication would help to instill change or development but this has to be coupled with a proper tool for this communication. ICT technology can help both with the acquisition, interpretation and delivery of knowledge and the enabling of communication between groups. In developing countries there is still more to be done to realize the full benefits of this.

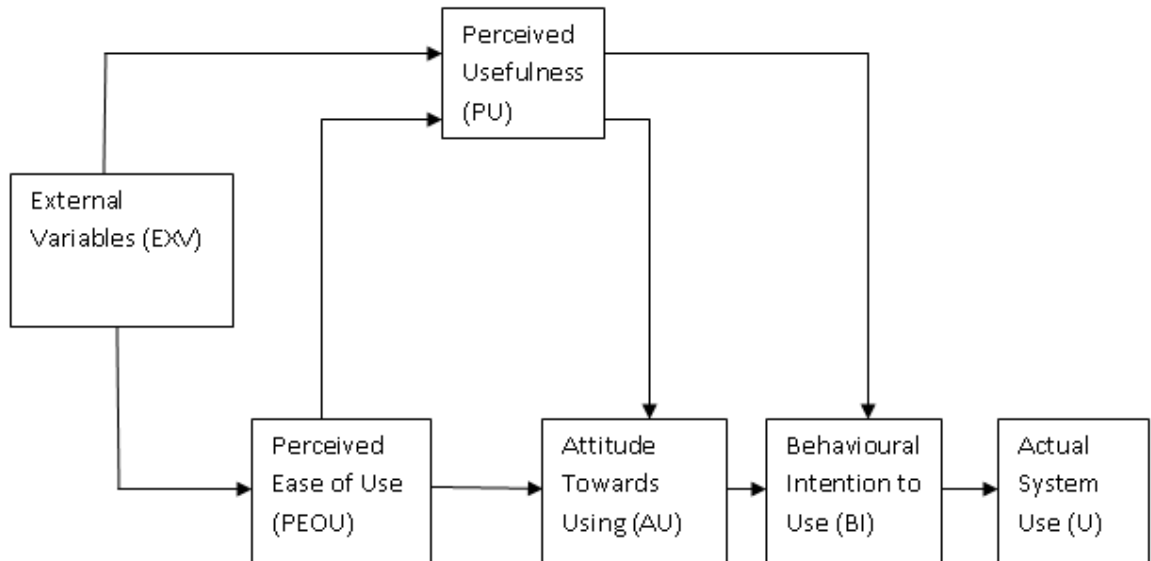
4.1. Barriers to the Growth and adoption of IT in Developing Countries

The launch of new standards in the mobile sector, the convergence of technologies and the steady increase in high-speed communication infrastructure have altered the way ICTs are accessed and used. However the benefits of ICT are not fully realized in developing countries as many have inadequate infrastructure and human capacity to support ICT besides other issues including political, cultural and technological.

According to P. Meso et al. (2005) the mobile ICT adoption and infusion in developing countries can be attributed to various factors such as age, culture, gender e.tc. which when carefully examined they do affect the ICT growth and use as well. Consequently an individuals' perceptions about a technology influence their acceptance and subsequent adoption of that technology; he further discusses the perception as depicted in Figure 4.1 with it having 2 main linkages to it that is **Perceived Usefulness(PU)** and **Perceived Ease Of Use(PEOU)**³ :

³Meso, P., P. Musa, et al. (2005). "Towards a model of consumer use of mobile information and communication technology in LDCs: the case of sub-Saharan Africa." *Information Systems Journal* 15(2): 119-146.

- PU relates to the user's 'subjective probability that using a specific application system will increase his or her job performance within an organization. PEOU is the degree to which the user expects the target system to be free of effort while using it. These two depicts the users influence on attitude towards using a technology (AU) and behavioral intention(BI) to using that technology.



Source: Meso et al. (2005)[57]

Figure 4.1.: Technonology Acceptance Model (Davis, 1989; Chin, 2000)

Imran, A. (2009) also in his research in Bangladesh stresses on the issue of attitude and knowledge which co relates to the PU and PEOU of the technology as a barrier to ICT adoption in developing countries. To be able to see to it that the adoption is successfully employed the attitudes should be changed⁴.

From the TAM(Figure 4.1) the external variables are the issues which cannot be attributed to the individual perceived usefulness of a particular technology and these are explained in the next sections while incorporating the individual use and attitude to adoption of the technology.

⁴Imran, A. (2009). Knowledge and Attitude, the Two Major Barriers to ICT Adoption in LDC are the Opposite Side of a Coin; An Empirical Evidence from Bangladesh. System Sciences, 2009. HICSS '09. 42nd Hawaii International Conference on.

4.1.1. Infrastructure

There are many kinds of equipments that can be used in adopting IT however the cost of these equipments is still a factor to low penetration of ICT in developing countries. According to ITU (2010) figures, broadly there is 22.5% of population having computers and only 15.8% accessing internet even with the emergence of different kinds of ICT infrastructure, including fixed and mobile telephony, Internet and broadband the growth is still hampered.

Developing countries are also constrained by resource scarcities. This lack of resources is characterized by poor transport, electricity and telecommunication facilities. To effectively utilize ICT and see it grow the availability of equipment, supplies and services of computers, multimedia information providers, broadcasting and content is important. It is also noted that most of the rural areas in developing countries do not have electricity(Kessy et al,2009)[26].

New technologies, and changes in usage can increase access to ICT. However this technological advances for instance recent developments in wireless local area network technologies are raising new hopes for internet diffusion in parts of the developing countries but they do require infrastructure. Old infrastructure need to be upgraded and this still brings the issue of accessibility which could still be hampering the ICT adoption.

4.1.2. Economical /Cost issues

Economic/ cost issues relates to the ease to which one can be able to acquire, access and use the technology. Where the technology cannot be readily accessed, subjects are prone to perceive the technology as not being easy to use, when in fact it is easy to learn how to use the technology and relatively simple to apply the technology for different use in performing certain tasks or duties. On the other hand if the technology is readily available

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its use and diffusion can grow immensely and help achieve its full benefits.

Sharma(2003) [25] notes how developing countries are reliant on substantial foreign assistance to ensure the development of ICTs. This is because the cost of building the infrastructure is high in developing countries, also acquiring costly new technology without making provisions for the proper infrastructure cause the country to end up being in financial debts. Most of the time developing countries would implement new technology without consideration of what effects the technology would cause and whether the market is ripe for it. Thus there is need to study the market and reduce the costs that would be associated with investing the wrong technology at the wrong time or which will end up being under utilized to realize its benefits.

The costs for achieving the ICT equipments are still high as well access of internet which drives the development of ICT .For instance ITU facts (2009) show that “ *in Africa, the cost of the ICT Price Basket represents 41 per cent of the region’s monthly average income while in In Europe, where income levels are highest, relative prices for telecom services are lowest*”. This shows that with high prices to pay for access of IT hampers its growth especially where the income levels are also low.

Kessy et al(2009)[26] discusses more on cost relating to the purchase of ICT media, hardware and software; the setting up of appropriate telecommunication networks; maintenance and repair of facilities when necessary. The costs are in most cases exorbitant and cannot be provided for by most African countries population apart from the rich who are able to afford. The poverty level in developing countries is also a factor with many living under 4USD a day thus the cost of achieving ICT services should be affordable and accessible to the majority not only the few.

4.1.3. Cultural differences

ICT technology help to improve cross cultural collaboration through communication technologies like Email and fax, which enable near instant communication over long distances. However technology in itself is not enough to enable smooth collaboration. Differences in culture still manifest themselves, and more often than not turn into conflicts that have the potential to make the growth and use of the technology or alternatively shun the technology altogether.

According to studies carried out culture is considered to have a strong influence on whether and how individuals, organizations and societies use ICT. The outcome of the studies show that :technology diffusion differs across cultures; diffusion patterns in a given culture are influenced by the culture's beliefs, norms and values, among other cultural dimensions; and different cultures tend to prefer different technology. These cultural differences are evident in developing countries and need to be addressed to ensure proper ICT diffusion and use(Meso et al,2005)[57].

Sharma(2003)[25] on cultural differences discusses aspects of gender, age,ethnicity and educational attainment that affect the access to and use of ICTs. A notable area is the radio and TV programmes, computer software and the printed texts being created in different countries having different cultural backgrounds that might hinder its use. It does not mean that the people in developing countries are not smart to use computers but when the language of use is a hindrance then it causes many to shy away from the technology and have lack of interest in its adoption and use. Women's professional role and that of men is also discussed as a barrier

Kessy et al(2009)[26] also points out how technology was viewed as just for developed countries and had nothing to do with developing countries. Such views depicts a trend where people in developing countries are resistant to new innovations in their environment let alone the use of ICT in helping in socio-economic development.

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Being able to find a balance between the local culture and the technology to be adopted is such a barrier even though the perception has changed and people are embracing the new information age. Language as a cultural difference could depict itself in areas such as the internet for those who can read many only know a local language, while the internet is dominated by English-language content therefore a challenge for its use. It can be noted however that current trend show that they have tried to incorporate other languages to cater for use by those who cannot understand English.

Ahmad(2009)[24] in social cultural context that affects adoption of ICT in developing countries talks strongly about the knowledge and attitude which he further explains knowledge as what is possessed by individuals as: *“how well they understand fundamental IT concepts, how well informed they are about IT in their organization”*. This knowledge affects the attitude with the adoption of ICT whereby when people have IT knowledge then they will have a positive attitude towards IT. This knowledge is seen in 3 perspectives: IT education background, IT skills and IT awareness all contribute to having a more positive attitude. Attitude or mindset by individuals towards IT adoption could be affected by lack of motivation, resistance to change, acceptance of new ideas, fear of unknown and fear of losing one's job in an organization.

Different kinds of attitude by certain individuals in organizations will see that some will tend to block and oppose ICT diffusion either because of ignorance of its full effects but also through an evaluation that their personal and professional status will be compromised. These attitudes vary from proactive to reactive and as such organizations need to be able to understand and develop ways that can foster favorable attitudes while adopting any new technological advances(Imran, A,2009)[58].

4.1.4. Political

Political challenges could be attributed to the the power struggles seen with the different leaders in power. Some may have vested interests in enhancing the IT in a particular area like rural and urban, working in IT industry or other services and getting easy access to the IT products. The leaders might as well misappropriate funds that have been allocated for the development of ICT and this brings the issue of corruption that can be seen in many developing countries.

Such corrupt practices often leads to funds being embezzled and the little that is left ends up not being enough for the intended use. It can also be seen that countries which are democratic and are ready to share information, have shown progress in the adoption of ICT, whereas in the places dominated by dictatorship or autocratic form of government the progress is less (Sharma,2003)[25] .B Lane(2006)[52] adds that corruption comes in different forms such as actual and potential influence of the political system in the form of excessive patronage, nepotism, job reservations, favors for favors, secret party funding, and close ties between politicians and businesses. This practices do hinder the growth.

Political weakness is still facing most developing countries which has a direct effect on the implementation of policies. Due to the lack of policies implementation and its effect on long term objectives ICT growth is facing more obstacles than other development areas and competitive advantages are becoming hard to achieve which also affects the businesses that would grow due to proper technology in place.Even though the political will to see the technology is achieved is there, certain bureaucracies imposed on the acquisition of the technology is still high.

Government policies also regarding a particular technology may be in favor of one and against another as such the ICT policies need to be streamlined to avoid such. Strategies that are in place have to be harmonized to avoid issues such as random adoption of different systems and standards, unnecessary duplication of effort, and wastage of already scarce

resources that would hamper the development of ICT(Kessy et al,2009)[26].

4.2. Bridging the digital divide

The barriers that exist are in fact the digital divide between the developed and the developing countries. To be able to bring the developing countries towards the current global information age the gap has to be eliminated or reduced. Mohanty(2008)[28] talks about how digital divide from his perspective depends not specifically on the speed of adoption of the ICT technology i.e. by their basic infrastructure conditions, but differences in the intensity of adoption(WTDR 2010) [23]. Ways to bridge this divide would include:

4.2.1. Technological developments

New technologies, and changes in usage, can increase access to ICT. Recently there is development in wireless local area network technologies which would enable the developing countries to use in the benefit of increasing its advances in ICT development. Developing countries can as well utilize the use of Open Source Software (OSS) which is also an expanding area and since there is no licensing fee attached to it they are cheaper to acquire than proprietary software(Choudhary et al ,2008)[29].

Ibikunle et al (2008)[34] describes how use of WiMax the new technology would improve penetration of IT development in developing countries. He describes how WiMAX is aiming at providing a universal ubiquitous and equitable and affordable access to ICTs infrastructure. Using WiMax coverage area is extended and it is a much more cost-effective solution than wired technology in areas with lower population densities. WiMax solutions can also be deployed quickly, providing communication links to the under served areas besides the other regions which are already connected.

4.2.2. Role of the industry

The ICT industry play a role in trying to bridge the gap even though it can be questioned because if the development of the industry is left to market forces alone, some areas or societal groups considered unprofitable to service might be left without access to ICT. It can be noted that For example in India Intel is working to address problems in rural areas, where PCs are affected by heat, dust and unreliable power sources. Ericsson in partnership with the United Nations Development Programme, is also working towards improving mobile coverage for rural users in the developing world. Many industry commentators attribute the rapid increase in mobile telecommunications in Sub-Saharan Africa to private sector investment.

4.2.3. The role of national governments

When developing and adopting ICT it should not just be to for the “high tech” end of the market, such as mobile phones with multimedia exchange, tend to benefit the middle classes rather than improving basic levels of access for all. Governments sometimes set targets for ICT uptake which are too ambitious to be realized; therefore it is important that the strategies and policies that governments pursue should enable to increase internet and broadband access and usage in rural areas intensifying computer in ICT markets. The accessibility should be able to cater for all.

According to ITU statistics it is noted that mobile technology diffusion in developing countries has increased tremendously however the access to local internet access is predominantly low especially in the rural areas where there is lack of electricity and the high price of computers and Internet. The government can create and adapt policies that will intensify competition in all ICT markets, adapting universal access and service policies in order to integrate the delivery of ICTs to rural areas, and fostering wireless broadband access.

Education and IT skills training play a role in improving access to ICT. However the problem comes with how to raise awareness and generate demand. In developing countries there are donor-funded telecentres (Offering a range of telephone, computing, internet and information services) thus play a role in familiarizing people with basic ICT. Governments should ensure that these telecentres are operated according to the government rules and regulations(WTDR,2010)[23].

4.2.4. Role of International Community

The international community play an important role in ensuring that the ICT adoption and use is achieved worldwide especially now that we live in a digital world. For instance **The Millennium Development Goals** (MDGs) agreed at the United Nations Millennium Summit in 2000, aim to reduce world poverty and improve lives by 2015. In achieving the MDGs it is stated that by use of ICT the realization can be reached . Key international community involved in helping achieve this with help of ICT are:

1. **World Summit on the Information Society (WSIS)**, a two phase United Nations (UN) summit aimed at overcoming the digital divide and creating an all inclusive Information Society. While WSIS brought together many actors in the ICT for Development(ICT4D) field it lacked representation from the ICT industry (particularly from developing countries); formulating ideas without the key players become detrimental to the growth. WTDR tries to follow on the implementation of the targets set by WSIS⁵.
2. **New Partnership for Africa's Development (NEPAD)** is an African-initiated strategic framework for the continent's revival that identifies ICT development as a priority action area.It focuses on two key areas: the rapid development of ICT infrastructure and dissemination of ICT skills across the African population by implementing an

⁵[HTTP://www.itu.int/wsis/](http://www.itu.int/wsis/)

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e-school program across primary and secondary schools. Even though it has been widely praised for having placed ICT on the development agenda some critics suggest it lacks the resources and infrastructure to fulfill its goals⁶.

3. **Commission for Africa (CfA)** is a UK government initiative set up in 2004 to stimulate development in Africa. The CfA report from 2005 recognizes the importance of ICT in many areas, including higher education, economic growth, governance, culture, trade and finance. It urges donors to increase funding to support free media (including new ICT such as internet broadcasting).

⁶[HTTP://www.itu.int/itunews/issue/2003/02/](http://www.itu.int/itunews/issue/2003/02/)

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The use of the mobile phone in many markets in the 90s was seen as a nice to have service and as an extension of the fixed line network services but nowadays it is part and parcel of every consumers life. By the early 2000 the mobile industry had grown and as noted by Mureithi(2003) this growth surpassed the fixed line network but most of the countries especially in the African market were riding on the fixed line network infrastructure among other issues. He also discusses the effects that liberalization of the telecom industry has had on this upward growth ¹ .

Sridhar (2007) [47] on the other hand attributes the growth of mobile industry in India and other developing countries to the quick deployment, competition, advancement in technologies, and reduced cost of access. The use of the mobile phone has even driven the upsurge in growth of ICT use especially in areas where the IT infrastructure is not available yet.

As indicated in the ITU Figures (2010) in developing countries, mobile cellular penetration rates will reach 68% at the end of 2010 mainly driven by the Asia and Pacific region especially India and China. In the African region, penetration rates will reach an estimated 41% at the end of 2010 (compared to 76% globally) leaving a significant potential for growth. Development of the ICT has seen many prospects of telecom market and thus

¹Mureithi, M. "Self-destructive competition in cellular: regulatory options to harness the benefits of liberalisation." *Telecommunications Policy* 27(1-2): 11-19.

the upsurge of the mobile penetration and use with the mobile phones use in developing countries being recognized as a potentially transformative technology platform.

5.1. Growth of mobile industry

Even though the penetration of the mobile industry in developing countries still has potential growth we can see that the growth has seen a steady upward growth which can be attributed to different factors. As seen in Figure 5.1 developed countries have already reached saturation levels with their mobile subscriptions but the developing countries are also catching up. In the next section i discuss the factors that have contributed to the growth.

5.1.1. Liberalization of Telecoms

In developing countries the telecom industry was majorly owned and operated by the governments in place and this made other investors interested in the market not to venture into this as the rules and regulations put in place were too stringent for them. However this has changed and the telecom industry has been liberalized, deregulated and even privatized in most developing countries. Through this the rules and policies put in place are flexible and encourage more private investors to come instead of the monopolized industry as it was in the 1990s where the few who even owned the mobile phone were the rich and affluent[29, 30, 31].

Fink et al(2003)[48] discusses about the findings that were gotten by several authors who analyzed the developing countries growth of mobile use and it was noted that privatization significantly increases teledensity and telecom productivity. He notes however that it is mainly the interaction of privatization and competition that brings about the higher penetration and productivity. It is therefore important that the market is liberalized but the

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policy regulators ensure fair competition among the operators. Telecoms policy and regulation must as well facilitate knowledge network development in new knowledge based economies and societies

Another issue with liberalization that regulators and policy makers need to address in line with competition is to keep license fees to a minimum, and that any lack of transparencies in the business climate are addressed. When all is ripe and policies in place are favorable the mobile penetration will continue to grow translating to a higher growth rate in teledensity, and higher efficiency.

Gao et al(2009)[50] also points out that when the telecommunications industry is liberalized the policies put in place of supporting market competition help attract foreign investment. These investors tend to construct a world-class infrastructure and with good infrastructure in place the operators become motivated to reduce prices, increase service quality, provide more services to customers, and expand network coverage to reach out to new customers. With low prices this attracts mobile penetration to many especially to those who were unable to afford before.

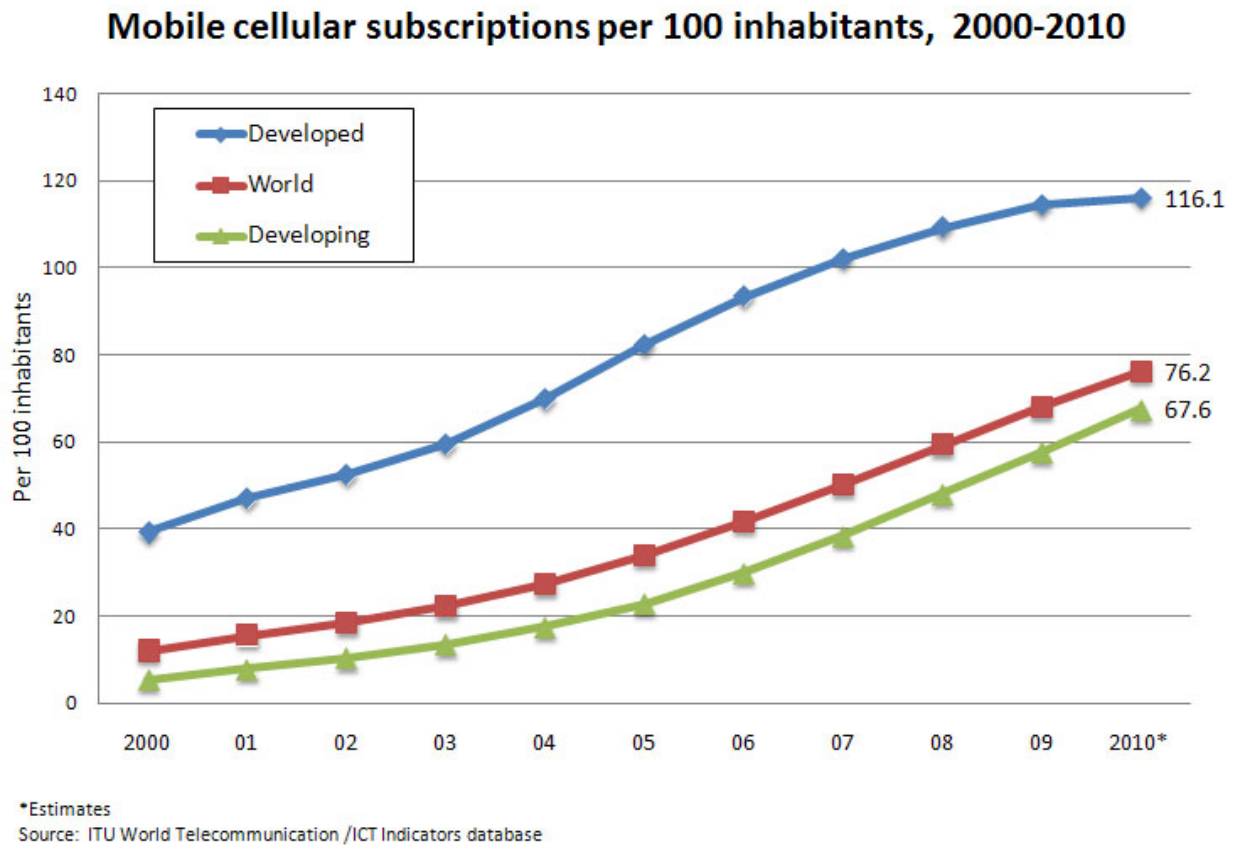


Figure 5.1.: Mobile Penetration by Development

5.1.2. Technological advancement

The telecoms infrastructure has grown and is impacting the growth of the ICT developments and thus with new technological advancement the benefits and ways of accessing the technology is changing. Now we see that the wireless technology has sped up the progression of universal accessibility. Having such technologies in place that is Wireless Local Loop (WLL), Very Small Aperture Terminal (VSAT) and Multiple Access Systems, applied as stand-alone technologies or combined are also enabling a large number of countries to connect their rural areas and thus increase the subscriber base to the network at large. In developing countries this could be seen in Chile, Colombia, Ethiopia, Guatemala, Kazakhstan, Peru, South Africa and Thailand. Many more countries are now investing in these technologies and thus the growth of the mobile industry to even the low density rural

areas where the cost of laying out the wired network infrastructure is still too high to be sustained².

As a result of market and regulatory reforms the mobile telephony needs grew with the demand being on the high, the supply of such services needed to be aligned in providing the services that were beneficial to all. For instance in Africa mobile operators have been quick to see the benefits of prepaid services especially in a region where per-capita incomes are low, and payment upfront in cash is generally the preferred means of payment. Unlike the norm in many developed countries where they prefer postpaid services being able to use operations that work has seen the growth of mobile use as people would prefer use of paying upfront for the service than paying later. This also reduces risk of bad credit that operators would incur. By using prepaid services has also ensured that the operators offer services that would cater for this group of consumers as well³.

The use of prepaid billing is also used in other developing countries such as India, Pakistan, Thailand and Philippines and this prompted the growth of mobile penetration. Using prepaid billing offered instant connection availability of the mobile phone and thus mobile service operators gained more superiority against fixed line operators (Gao et al, 2009) [50].

The need to access the internet has also seen that many developing countries use their mobile phones to access the internet as compared to developed countries where the access of internet is through many sources. The reason to use a mobile phone to access such services is mainly because the mobile device is easily accessible and is cheap to get than other means of accessing internet. This trends have seen the preference in the choice of telecommunication from the fixed telephone which is now lagging behind.

²Gasmi, F. and L. Recuero Virto "Telecommunications Technologies Deployment in Developing Countries: Role of Markets and Institutions." *Communications & Strategies*, No. 58, p. 19, 2005.

³[HTTP://www.itu.int/AFRICA2004/](http://www.itu.int/AFRICA2004/)

5.1.3. Market trends

Being in a competitive environment where there are more than one mobile operator in the market the market model is redefined so as to get more subscribers. This has made cellular operators to shift focus on higher volumes of traffic achieved through lower tariffs and consequently lower operating margins driven by competition. Market action by operators with their competitive nature lowered barriers to new entrants into the market through reduced prices of terminals, connection charges and indeed the ability to receive calls and make emergency calls once connected⁴.

Even though the subscriber base increased with the entrants of more than one operator, the tariff charges for calling were still high and therefore to be able to attract more users saw introduction of innovative services from mobile operators; services such as one being able to just use a text message to inform the other party to call the person. The text message service is a non charged service and the users are allocated a certain number for use in a day. This service is called calling party pays (CPP) implies the person calling back pays for the service while the receiver does not unlike in the past where the call charges were on Receiving Party Pays (RPP). The service was first introduced in 2003 in India and it has gained popularity among developing countries such as Bangladesh and Kenya. In South Africa and Tanzania mobile users reduce costs by “beeping” the call recipient which is a similar concept to CPP ,in Asian countries such as Indonesia, this practice is known as “menacing” or “fishing”. Such innovations targets even the low income earners and encourages people to use mobile phones and the operator on the other hand still collects revenue due to the fact that the person is called back (B Lane et al,2006)[52].

By studying the market trend and being able to offer services needed by the users competition is increased among the service providers to be able to get more customers. Through such competition it forces the price to come down and improves options for people to sub-

⁴Mureithi, M. "Self-destructive competition in cellular: regulatory options to harness the benefits of liberalisation." *Telecommunications Policy* 27(1-2): 11-19.

scribe for mobile services. This has a direct effect on attracting more users to the use of the mobile phone and thus increases its penetration to even rural areas of developing countries where basic necessities lack.

Sridhar (2007)[47] categorizes this competition into price based competition and other non-price competition strategies such as marketing innovation and flexible subscription offerings. When it comes to innovation the mobile operators are always eager to offer services that are able to attract more customers in their network and it is only achieved through rigorous study of how the subscribers use the mobile phone.

Non price based competition made mobile operators to ensure they come up with mobile initiatives that are attractive offering numerous services to users. Putnman(2009)[32] discusses initiatives such as the development of “m-banking” systems intended to lower the cost of financial services in developing regions including South Africa and Kenya thus reaching a wider population of the country. In Nigeria mobile phone has been used to benefit textile producers in Nigeria ;help solve health and agriculture problems in Bangladesh and also use of mobile service for messaging to help farmers in India with the “mKrishi,”. All these initiatives and many more drive many users to use the mobile phone as it caters for their daily needs that would have been unimaginable few years back.

Vatsalan et al (2010) while discussing the use of the mobile phone technology for health-care services he notes that in most developing world there are 50 of these types being recognized to being used in 26 countries. The largest mobile health(mHealth) projects being in India having 11 while South Africa and Uganda 6 each. These mHealth services are offered through the use of the mobile phone and has enabled many people in the developing world to be able to access the basic services that they would normally walk long distances to get. These initiatives thus attract more subscribers to the use of the mobile phone due to the ease to achieve and carry out certain activities like getting updates on diseases, having your queries being answered, being reminded about appointments or even sending alert messages about disease outbreaks. Due to scarcity of resources in developing countries use

of the mobile becomes a major boost to achieve many tasks and hence upward growth in its use⁵.

5.2. Barriers to the growth

5.2.1. Income

Income is one of the major hindrance to mobile penetration in developing countries. A lot has been researched on the effects of income levels to the penetration levels of both fixed and mobile telephony and it is concluded that greater Gross Domestic Product (GDP) per-capita signifies greater affordability which in turn increases demand for mobile telecommunication services and vice versa. When it comes to developing countries where the GDP is low as those living under a dollar a day may not be able to afford the mobile service as they would prefer channeling their funds to other uses(Sridhar, V 2007)[47].

Due to the fact that the majority of the people in the rural areas are low income earners it affects the penetration as most households would use the mobile phone as a household asset. As such the teledensity is low and their purchasing power is as well low so mobile operators would be hesitant to increase the network coverage to such areas for fear of not getting benefits out of the investment in the telecommunication services and thus prefer expansion in the urban cities.

5.2.2. Network Infrastructure

Scarcity of resources affects the network infrastructure building and construction, physical infrastructure resources such as proper road network and electricity spread is still a prob-

⁵Vatsalan, D., S. Arunatileka, et al. (2010). Mobile Technologies for Enhancing eHealth Solutions in Developing Countries. eHealth, Telemedicine, and Social Medicine, 2010. ETELEMED '10. Second International Conference on.

lem in developing countries; especially in the rural areas where the state of the roads is bad even not tarmacked and electricity spread is not in all parts. The telecommunications infrastructure include Base Transceiver System (BTS) that do require constant supply of electricity even though they have backup power. Therefore the government need to ensure that all parts of the country have these necessities as they hinder the growth of the network infrastructure. Due to this mobile operators would take a long time to develop such areas as it would be costly to maintain the equipments especially in the case where they have to rely on backup power from their diesel operated generators all the time.

The existing telecommunication infrastructure could also be used but in most cases it is outdated to cater for the new services and thus require upgrading and purchasing of new and modern equipments. Gasmi et al (2005) states another reason that cause the costs to be so high in network installation and maintenance to the weak economies of density in rural areas unlike in the urban areas⁶.

As subscriber base increases then this has a profound effect on the network infrastructure. Hudson (2009)[33] reflects on how in developing countries when it comes to designing networks and projecting revenues, planners often assume that there is little demand for telecommunications and thus end up creating an infrastructure that cannot sustain the growth. The planners should therefore take into account the future growth of the network and thus project for the growth and the likelihood of the technology being obsolete requiring upgrading of the infrastructure or even acquiring new technology.

5.2.3. Regulatory issues

There exists different tariff structures for fixed and mobile services as regulators issue separate licenses covering the two. Eliminating of these licensing distinctions may accelerate access. Another issue with licensing body is the problem with protecting the

⁶Gasmi, F. and L. Recuero Virto "Telecommunications Technologies Deployment in Developing Countries: Role of Markets and Institutions." *Communications & Strategies*, No. 58, p. 19, 2005.

mobile providers to ensure that there is a level playing field in the competition. The length and terms of operator licenses should avoid or limit issuing certain rights that would cause exclusivity in providing certain services to a particular mobile operator .Hudson (2009)[33].

Gasmi et al(2010)[49] points out the responsibilities of regulatory bodies which range from “*setting network expansion targets, approving (and in some cases setting) tariffs (including interconnection charges), setting technical standards, licensing, arbitrating disputes among operators and users, allocating spectrum frequencies, and monitoring service quality, among others*”. These responsibilities are too large to be dependent on one regulator and to improve services rendered by regulators it is best if there is an independent regulator. In most developing countries most of the decisions were set up by the government and this saw that other operators are favored in the policies made. The restructuring of the regulatory body will ensure that such discrepancies are eliminated and the process transparent. Transparency would ensure that consumers and businesses are protected, and would therefore be less likely to serve the interest of politicians or a particular interest group(Gao et al,2009)[50].

When it comes to interconnect rates between existing players in the industry they are also still high thus hampering them to venture further into areas which previously had no network coverage. A clear and transparent way of doing things should be encouraged to foster fair competition which translates to higher teledensity and growth in mobile penetration to even the rural areas. Some countries have eliminated these regulatory barriers but others still have.

5.2.4. High import duties and taxation

Since most of the network infrastructure are imported most developing countries have high import duty on such equipments. Import duty is good for the country as it does bring

revenue but it increases the cost of network facilities and end user equipment, and thus the cost factor trickles down to the citizens. High cost of achieving the equipment means that it will be costly for the user. The governments should try to minimize such costs and for the operators try to share infrastructure to offer services at an affordable price for all (Hudson, 2009) [33].

Some developing countries pay royalty fees for every new connection to the network. For instance in Bangladesh they were paying US\$16 “royalty” charge annually per connection, and this only applied to mobile subscriptions and not fixed subscriptions. Mobile operators were left to also pay very huge taxes such as VAT taxes on usage charges, revenue share charges, royalty on handset, BTS on royalty, License fee e.t.c. All these charges were too high and limited the growth of mobile industry and at the end very few mobile operators who can afford them stay afloat and offer mobile services. This as well has an impact on how the consumers will adopt and embrace the service if too high then most will not be attracted to it (B. Lane et al, 2006) [52].

International community have come out to urge governments in developing countries to reduce the high charges imposed on the mobile network operators. For instance GSM association urged Bangladesh Government to Lower mobile taxes in order to boost overall government revenues, to have an overhaul reform of its regulatory policies and to also eliminate SIM Card Tax ⁷.

5.2.5. Retail Pricing and Interconnect Rates

Different mobile operators have different tariff charges for different services offered. These tariffs at times lock the user to one network since the interconnect fees are too high to use services from the other operator fostering unfair competition. Chabossou et al (2009) [51] mentions how contract and prepaid tariffs in African countries vary across the operators to

⁷More information on this can be found at the GSM website: [HTTP://www.gsmworld.com/newsroom/press-release/2009/3493.htm](http://www.gsmworld.com/newsroom/press-release/2009/3493.htm)

an extent that a product to product comparison is impossible for consumers. This lack of price transparency and rapidly changing promotions can hamper the mobile penetration as the consumers end up not being able to select a product that would be useful to them due to the available conflicting information.

Other operators as well bill the users on per minute billing system and this doesn't work well with the developing market whose users are price sensitive. The preferred billing system would be per second billing so that the users can see how much they have spent in a voice call. Also the mode of charging should as well attributed to the usage of the internet services on the mobile phone should be based on amount of data downloaded or uploaded instead of the time spent. When such charging modes are applied the users who are low income earners would feel as though they are being sidelined to use the mobile service and thus hinder the penetration. B.Lane et al(2006) [52]

Having high interconnect charges mobile operators would definitely pass on the cost to the consumer of the service and at times the charges are so high to be sustainable by the subscriber. The regulatory body should try to regulate the interconnect charges to avoid cases where the other operators have unfair competition strategies and as well ensure a better or increased quality of service, reduce tariffs, and encourage increased investment to expand coverage.

Part III.

Methodology

Chapter 6.

Research Method

In this chapter i will describe how i carried out my research work discussing the research method used in the first part highlighting the different methods available, data collection method used and finally i evaluate the method selected by use of the set of principles set out by Klein and Myers (1999) [68].

There are several methods that can be used in carrying out research work all dependent on factors such as information that is expected, aims of the study, nature of the phenomenon that is whether it is feasible to collect the data, cost of the design e.t.c (Yin 2003)[66] but most importantly on results expected. Galliers (1987) identifies several methods used within the field of information system research such as Laboratory experiments, field experiments, case studies, simulation e.t.c. Each approach has its own advantages and disadvantages dependent on a particular project being undertaken[64].

These methods can also be classified as quantitative or qualitative:

Quantitative research focus on use of quantifiable values(how much, how often, how many e.t.c) in order to verify or dispute a hypothesis and are normally applied in positivist research that requires statistical analysis of numbers. Quantitative research is more suited to methods such as surveys and laboratory experiments.

Qualitative research on the other hand involves the use of qualitative data, such as inter-

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views, documents e.t.c to understand and explain an occurrence of subject being under investigation to gain a deeper understanding. It does therefore attempts to answer what, where and why questions. Qualitative research is normally rooted within the social science context.

In my research i would like to study the thriving use of the m-banking service being offered by the mobile industry in the Kenyan market whether their use was something that related to the policies available and the reasons that have lead to several new innovations towards it. To achieve this and gain an in-depth knowledge of discovering how and why this has evolved i had to try to understand it in the view of policies that guide such service requiring the views from the mobile operators to be gathered, how the user experience affects the growth and the changes that are accompanied with the growth of the service to higher levels.

Walsham (2006) [65] states that interpretative methods of research are *aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context of the information* . Unlike Positivist approach, interpretive researchers consider themselves dependent of the phenomena under study and believe that their action of presence has influence on the findings through social constructions such as language, shared meanings, documents, consciousness e.t.c (Klein and Myers, 1999)[68]. Given my context of study interpretative method was most suitable to analyze how and why the m-banking service has revolutionized the mobile sector in Kenya and what opportunities arise for the mobile sector from its usage.

To get a good understanding of the “state of the art” about the mobile industry i had to do a literature review as well. I reviewed several publications on the early days of mobile industry to where it is now and the different standards that have been applied to each technology along the way. I also read about issue of mobile payment service especially in the case when it was only operated by one mobile operator Safaricom more is discussed in the next Section 6.1.

6.1. Context of research

The mobile payment service was first introduced in Kenya in 2007 by Safaricom with brand name Mpesa¹ and even though this service was already in use in Philippines as early as 2001 the service has been embraced by many in the Kenyan market^{2,3}. It can be seen that mobile operators have also entered into partnership with different organizations such as western union to allow international money transfer, leading banks to offer on the go services like giving one access to shopping online, ticketing, bank accounts access, payment of different services e.t.c. When we look at the innovation of this service we see that unlike the banking sector that initially targeted the people at the high end, it targets everyone both the rich and poor. All the 4 mobile operators in the country have embraced m-banking service with each having a different name for it see(see Table 7.4) in Chapter 7.

Alot of research has been done on the rise of this service in Kenya and most notably by Olga in her PHD theses [69, 70, 71] and she asserts that no particular reason could be attributed to its success but the most obvious development in M-banking service has been the information and communication technology (ICT) revolution. Through use of ICT innovation in the mobile industry has seen tremendous growth especially with use of mobile phone to offer financial services in Kenya. Even though Kenya as a country is still lagging behind in other areas with growth and expansion of ICT when it comes to the mobile industry this is different and it is seen as a major leap to offering banking services without necessarily going to the bank.

¹M-PESA was funded by Department for International Development (DFID) part of the UK government that provides aid to developing countries in conjunction with Vodafone UK.

²Mobile payment systems are now seen in many developing countries. In the Philippines, Globe Telecom operates GCASH, and in South Africa WIZZIT facilitates mobile phone based transactions through the formal banking system (Ivatury and Pickens, 2006[59]). There is also mobile banking technologies developed in Sudan and Ghana, in a number of countries in Latin America and the Middle East (Mas, 2009[60, 61]). More related overviews see also Mas and Rotman (2008[62]), Mas and Kumar (2008[63]) and the many publications of the Consultative Group to Assist the Poor, at www.cgap.org visited on 15th April 2011.

³Mobile banking in Emerging Worlds at NY Times found at :[HTTP://www.nytimes.com/2010/11/29/business/global/29iht-mobilebanks29.html?_r=1](http://www.nytimes.com/2010/11/29/business/global/29iht-mobilebanks29.html?_r=1)

Without ICT then the innovations would not be successful and it is only through the policies and regulations that would drive such technological growth. This brings me to my research study to try and analyze the challenges and opportunities that exist in the mobile sector in Kenya while narrowing it down to the m-banking service whereby i believe with no ICT in place no technological advancement can take place. The research is to enable me answer the following research questions (RQ):

- *RQ1: What are the challenges and opportunities prevalent in the mobile sector in Kenya?*
 - *RQ1.1: What specific strategies and policies in place have helped the operators in the growth of the m-banking service?*
 - *RQ1.2: How do the operators handle challenges faced with the users in regards to the usage of the m-banking service?*
 - *RQ1.3: What are user experiences with the m-banking service and how can it be improved through the agents assigned in the field?*

6.2. Access to the field

According to Walsham, G. (2006) [65] *gaining and maintaining good access to appropriate organizations is very important in carrying out the fieldwork*. All these are coupled with good social skills and ability to be persistent in all that is done without having to step on those people or organizations that would be beneficial in the task to be carried out. When i look at my research area being focused on the mobile industry in Kenya my immediate target was definitely the mobile operators in the country. Prior to going for my postgraduate study i was working in Safaricom retail department offering services to walk in customers and these services ranged from handling customer queries while educating them about the services and products being offered by the mobile operator to handling cases dealing with

mobile banking services.

Having worked at Safaricom it gave me an edge to be able to get contacts of the people i needed for my interview, some of them i had interacted with. In cases where the individual i had not interacted with i used my former colleagues and other friends i knew from other mobile operators with exception of Yu network⁴ . With the advantage of that i identified subjects to be involved in my investigations and i was sure to have their collaboration in the study; without their cooperation, i would have to change my approach and reconsider the opportunity of using existing material as a source. I sent out my interview request letter with the set of questions for the interview to the individuals i had identified and followed with subsequent calls until an interview was scheduled for me.

While carrying out field work it is through persistence that would work and even though it took sometime before i got feedback from the interview subjects i did not easily give up until when it was too late to follow up due to time constraints with my work. As much as it is hard to accept no as an answer it does occur (Walsham, G,2006)[65] . One of my subjects in one of the mobile operator name withheld due to ethical issues told me i could not be given an interview due to the fact that my work was personal and it had nothing to do with the organization, persistent attempt with follow up emails or calls did not bear any fruit either.

I had not envisioned having any difficulties with accessing my interview subjects but for the few i had contact with snowballing was a challenge. At the end of it all i only managed to have to interview only 4 people in two mobile operators and this i can attribute to the inability to get these people due to overcommitment with the jobs so their time was very limited. Another issue i would say was due to the fact that most of the interviews were held in a meeting room in the office premises and since these offices had no open plan structuring i would only manage to get hold of the subjects i had contacted. Slow response to have interview scheduled is also a factor.

⁴Yu interchangeably referred to as Essar Network

Once given the go ahead to have an interview scheduled with the subjects i introduced myself and told them i had worked with Safaricom before pursuing further studies. This helped me develop rapport with my subjects and made them be at ease making our conversation a little bit easier to have.

Subsequently i considered other sources of information to supplement my interview and to this i chose to rely on use of documents that contain the policies and other publications on m-banking service in Kenya. Most of the documents and publications are web based and are easily available however in consultation with my supervisor i had to try and carry out an observation exercise. The observation to me was with regards to the m-banking agents⁵ to see how they offer services to the customers and carry out their tasks.

6.3. Data Collection

There are two different approaches to data collection qualitative and quantitative with data sources either being primary or secondary sources. In line with my qualitative data collection method i used both primary and secondary sources of data; primary sources being the interviews carried out and observation while the secondary sources were the policy documents that are already in existence (See Figure 6.1).

⁵The use of the term “agent” in this report is a reference to a party authorized by a mobile operator to act on their behalf and for whom the mobile operator is liable with respect to activities taken by the agent within the scope of its agency relationship or contract. In this case they are parties that offer m-banking services to the customers if they cannot be able to go to the mobile operator’s offices.

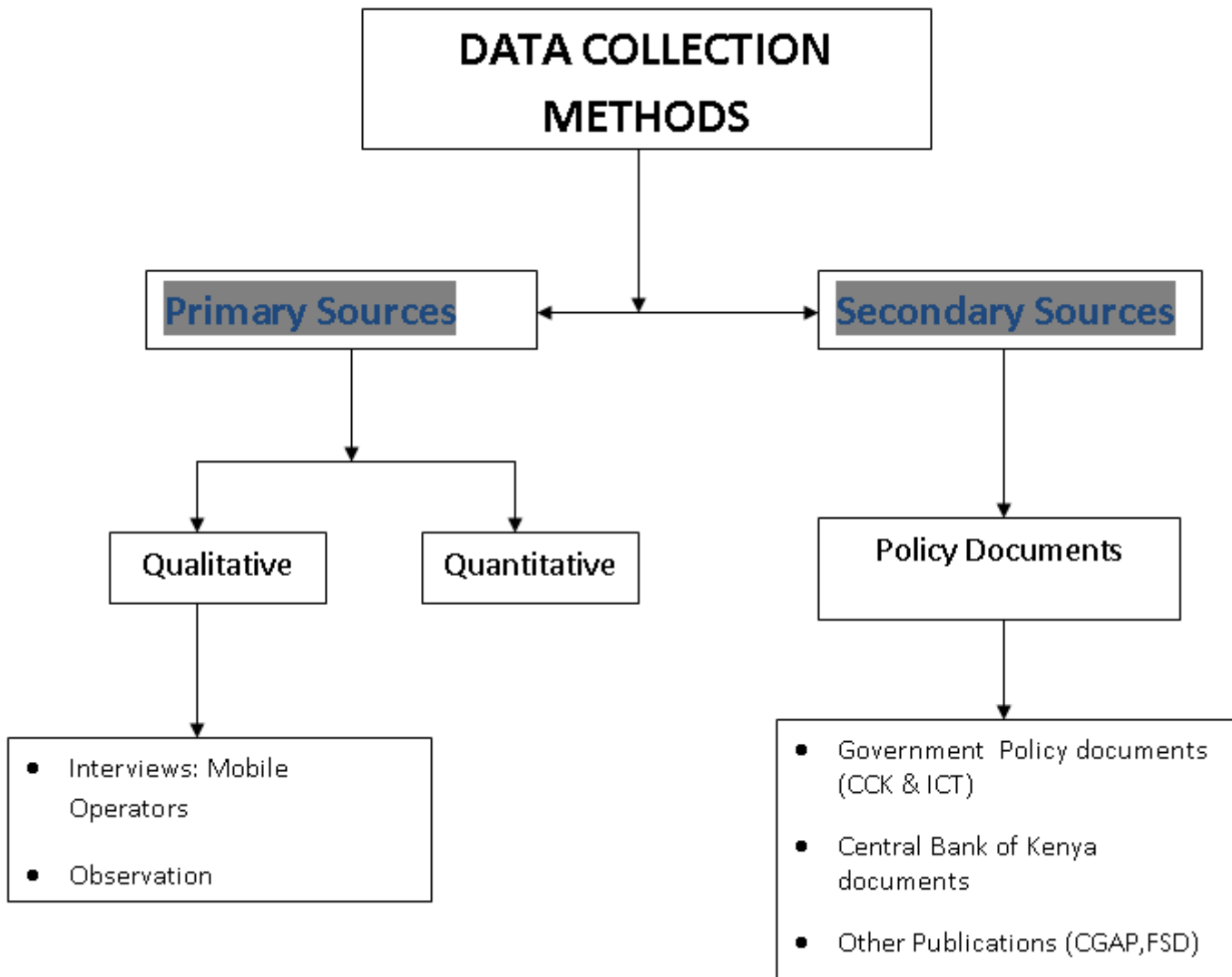


Figure 6.1.: Data Collection Methods

6.3.1. Interview

The choice of using interviews is because they are most commonly used in collecting data in most interpretative studies as the key to accessing the interpretations of informants in the field(Walsham,2006)[65]. Interviews can either be structured, unstructured or semi structured.

1. **Structured-** Arranged to answer specific requirements, therefore questions might be very specific in nature.

2. **Unstructured** -Aims to collect as many information as possible concerning the subject, hence, the interviewer asks generic questions or the interviewee is invited to describe the subject freely.
3. **Semi structured**-Set to ask both specific and general questions as the aim of the interviewer is to obtain some expected information besides other non predictable ones.

With expectation of receiving information that is correlated with the other stakeholders in the mobile industry i preferred use of semi structured interview with open ended questions which were similar. In order to have a structure for carrying out the interview i created an interview guide (See Appendix A) consisting of a set of questions that would help me during the interview. I subdivided the questions into 3 main parts:

Background and Skills

It consists of questions (i) to (iv) giving an overview of the department and how it is run and the background skills. It was a good starting point to understand the individuals who work closely with the regulatory department that handles policies and to get them relaxed. The target for this questions was the regulatory department only.

Policy Implementation

Questions (v) to (vii) were meant to tackle issues with policy implementation and what the organization feels about the whole implementation process. When it comes to strategies and different issues that are encountered in carrying out this task or with regards to specific policies in place for instance tariff regulation and effective competition i came up with questions (viii) to (xi)

Mobile Payment

In this set of questions (xii to xviii) i am able to uncover how the mobile payment service began was it an innovation or was it due to customer demand inline with competition. I get down to ask about the concerned parties in the service, strategies put in place to protect the consumer of the service and the roles played by the different stakeholders. In view of each organization i uncover what policies they would like to be changed for effective deliverance of the service to the customers.

Before carrying out the interview one has to start out with an introduction where the purpose of the interview is explained and the respondents get assured that the information from the interview is kept confidential (if this is necessary). Having had my interview guide i contacted my interview subjects who were primarily people working in the regulatory department and with their help they were able to get me the other individuals in the mobile money department to enable me carry out the interviews at the same day and time. To gather information from the interview there are three methods; taking notes, sound recording or video recording. I would have preferred to use both taking notes and sound recording however the latter was not approved by my subjects and thus i took notes down. Use of sound recording does help the interviewer to focus entirely on the respondent and all the information is captured by the recorder and does as well assist in validation purposes. My interview subjects as well requested for anonymity therefore names of persons interviewed are not mentioned.

In total i contacted 4 individuals from the 4 mobile operators regulatory department who were informed of the research prior to the interview and after their approval, i was able to have interview date scheduled for me. While i was taking notes i believe i might have missed important information from the interview subjects but immediately after the interview i had to transcribe my notes well to proper narratives that would make sense and in cases where i had forgotten something i was given the chance to follow up via Email. Even though i expected feedback from all the 4 mobile operators i did not get feedback from two;

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Safaricom and Yu but the other two were very cooperative and given my time limitation i could not pursue further but believe that the response gotten would be beneficial to my research.

As for Safaricom they recently had change in senior management roles and i believe it contributed to the last minute cancellation of giving me an interview but for Yu all the Emails sent and calls went unanswered. In Table 6.1 i show the list of people i interviewed , their availability to cooperate in my research and the duration of the interview. All the interviews were carried out at each mobile operator respective offices in Nairobi.

The results gotten from the two firms that i successfully held an interview with were analyzed in a qualitative way. The main focus was to find similarities and differences in how these organizations handled different aspects of policies and strategies in their firms with regards to the implementation and how they handle mobile banking service as a unit within them. No statistical measures were used to find relations between the answers and no feedback was given to the participants as would be the norm in other cases.

Mobile Operator	Interview Subjects	Duration and Date of Interview	Availability
Airtel Kenya	Senior regulatory Officer Head of Airtel Money	1 hour on 18/03/11	Yes
Orange Kenya	Regulatory Officer Legal Head of OrangeMoney	1 hour on 31/03/11	Yes
Safaricom	Regulatory(1)	N/A	No
Yu	Regulatory(1)	N/A	No

Table 6.1.: Contacted Persons

6.3.2. Observation

Having worked and carried my research work in the country i had not felt as though observation would be an ideal way of collecting data with regards to the agents of mobile

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payment service, however this was done as a last minute resort after consultation with my supervisor.

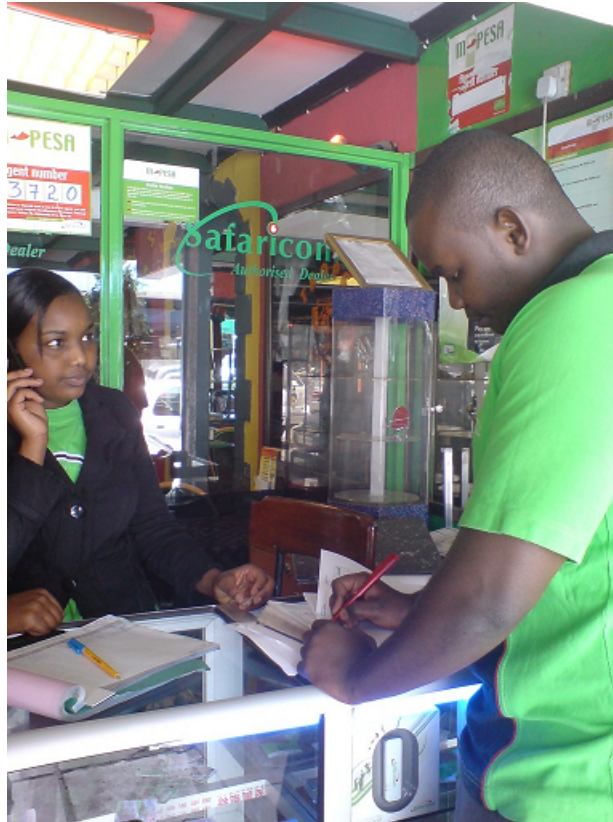
Doing observations has its own challenges which vary dependent on the type of observation. Systematic observers should be careful to watch for drawing wrong assumptions while participant observers must be able to identify how perception might change due to own background experience. However if done carefully, and ethically, observation can produce a wealth of information about social structures, culture, process, and human interaction^{6,7}. Nonetheless, it is difficult to watch and to collect data for a long period of time without affecting the environment one is watching.

Given my case having worked with Safaricom before it was ideal for me to take the role of a complete observer to see what the everyday customer experiences apart from those who are able to call the call center or who visit the retail centers for assistance. Being a complete observer meant i did not interact with any of the agents or the customers themselves, my identity was concealed and i maintained a distance. Gaining access to carry out any research work is important as it determines the outcome of your research however since i was taking the role of a complete observer my access was to disguise myself as a customer thus there was no informed consent. Even though my access was not an issue in circumstances where i would have required a consent to access the agent shop then the individual i would have talked to would be the owner of the shop who would definitely alert the agent assistant serving the customers. This would have impacted my data collection as the agent assistant would change his/her behavior towards the customers or the setup of the shop. However due to no consent and ethical consideration i was not able to take any pictures in the agent shops visited but from the Figure ?? displays what most shops looks like showing; the agent number for transacting is displayed, terms and regulations, instructions on the secret PIN⁸, customer care number for assistance e.t.c.

⁶Oates, B. J. (2006). *Researching Information Systems and Computing*. London, Sage Publications: Ltd. pp 202-219

⁷Brewer J, Hunter A. 1989. *Multimethod Research: A Synthesis of Styles*. Sage: Newbury Park, Sage Library of Social Research

⁸Secret PIN(Personal Identification Number) is a 4 digit number that is used for transacting and it is only



Source:CGAP ([HTTP://technology.cgap.org/](http://technology.cgap.org/))

Figure 6.2.: Overview of an Agent Shop

Equipped with a notebook for transcribing my notes i carried out the observation by visiting 8 different agent shops assigned to offer mobile banking services to walk in customers situated at two shopping malls Yaya Centre and Nakumatt Prestige in an upmarket area of Nairobi Kenya. Four more agent shops in the downtown part(Luthuli Avenue) of the city centre of Nairobi were observed as well bringing the total to 8 agent shops visited see Table 6.2.

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	Airtel	Orange	Safaricom	Yu
Number Observed	2	2	2	2
Location	City Centre at Luthuli Avenue	Luthuli Avenue & Yaya Centre	Upmarket Yaya Centre	Nakumatt Prestige & Luthuli Avenue
Mobile Vendor as well	Yes and No	Yes	No	Yes
Assistants Friendly	Yes and No	Yes and No	Yes	Yes
Tariffs Displayed	Yes	Yes	Yes	Yes
Duration of the observation both shops	30 minutes	30 minutes	40 minutes	45 minutes

Table 6.2.: Agent Shops Observed

At times i would queue like a normal customer in busy shops then i would leave if there were 2 customers ahead of me. I could not cover many shops due to the fact as stated earlier observation was not part of my data collection method initially and thus i had to adjust my schedule to fit. When it came to conversations i listened in (eavesdropped) most of the times and in other cases i used the recorder of my phone to tap in the information.

I observed how the customers would come in and join the queue if any for assistance and whether they felt they were well treated or were offered the required services and i also looked at the setup of the shops. I looked for varying experiences from the customers and agents whether a) Are customers secured while transacting at the agent's premises b) Were the agents friendly or not while serving c) Are the customers educated on other offers that are available using the M-Banking service?. After each observation i transcribed my notes to readable summaries and replayed the conversations recorded to make sense. Through observation i would be able to answer *RQ 1.3* which relates to whether having agents have a role to play in ensuring that M-Banking service thrives or is all left to the operators to

take the challenge ⁹.

6.3.3. Secondary Sources

In addition to carrying out interviews and observation as my primary sources of information i also collected information from the existing documents(Figure 6.1) that were available for my perusal. Combining several methods is called method triangulation and it enables in corroborating the findings as well as help in validity purposes of the information gathered where comparison of data from different sources and by different methods are done (Silverman 1993[72],Oates 2006[67]).

Since the mobile phone industry operations are governed by the ICT policies set by the government through the ministry of information and communication while being regulated by the CCK, my source of information was the national ICT policy document .The document contains the policies that exist and guide the telecommunication industry and the country as a whole in the venture to work with the growth of the ICT use in the country. CCK sector regulations document contains also different information regarding the regulations that are put in place to ensure that the ICT policies are adhered to as it should. Another source of information is Consultative Group to Assist the Poor (CGAP) with its several publications on mobile banking. A comprehensive list of documents analyzed is as shown in Table 6.3.

Apart from reviewing the policies in place i had to carry out a literature review to get an understanding of the mobile industry from the early days to where it is now and the different standards that have been applied to each technology. Regarding the mobile banking service i was able to read several publications on the issue especially in the case when it was only operated by one mobile operator Safaricom as discussed earlier in section 6.1.

⁹The term mobile Phone banking ,mobile banking (M-Banking) and mobile payment service are used interchangeably

Document	Source
National ICT Policy Document 2006	Ministry of Information and Communication(HTTP://:www.cck.go.ke)
Sector regulations	Communication Commission of Kenya (CCK: HTTP://:www.cck.go.ke)
Draft Regulation for the provision of Electronic Retail Transfer and E-Money regulations.	Central Bank of Kenya (HTTP://:www.centralbank.go.ke)
Technology Publications (Non bank E-Money Issuers: Regulatory Approaches to Protecting Customer Fund)	Consultative Group to Assist the Poor (CGAP HTTP://:www.cgap.org)
Consumer Protection Diagnostic Study	Financial Services Deepening(FSD HTTP://:fsdkenya.org)

Table 6.3.: Secondary Sources of Data

6.4. Reflection on the chosen research method

To evaluate my research method which is interpretive in nature i will make use of a set of principles set out by Klein Myers(1999) [68] which is a guideline on how to conduct and evaluate interpretive field studies from the philosophical principle of hermeneutics. There are seven principles in total and not all were applied as they should:

1. **The Fundamental Principle of the Hermeneutic Circle:** *“This principle suggests that all human understanding is achieved by iterating between considering the inter-dependent meaning of parts and the whole that they form”*.To study the m-banking service

which is part of the many services offered by the mobile industry in Kenya i had to try and understand the whole mobile industry. There would not be such service if there was no mobile technology and as such to get to understand completely the service the mobile sector had to be tackled. As for this principle i did not apply it on

the onset of the study as it should but i followed it subconsciously.

- 2. The Principle of Contextualization:** *“Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged”*. The fact that the study of my research was about m-banking service in Kenya i did my research in the country itself. Discussing the mobile industry in Kenya gives an insight into what is going on in the market and thus through the practices that are prevalent with the services being offered it becomes clear to see the trends in the market. After looking at various publications on m-banking service from way back when it was started in Kenya i see that apart from the ease of use and availability the technology change affects what is to be offered as well and it is evident that the service is still growing.

Despite technological changes the ICT policies have also had a role to play and it is not easy to predict what will happen in the next few years to come with this service unless i gather my own predictions which would be purely out of my own assumptions. However when we look at the m-banking service and how the mobile industry has grown it can be seen that these two are not static and they keep changing and never easy to know what the future holds but i try to understand this m-banking service in different perspectives. It cannot grow without the agents in place, customers experiences or the strategies put in place by the mobile operators in ensuring that it thrives.

- 3. The Principle of Interaction Between the Researchers and the Subjects:** *“Requires a particular reflection on how the research materials(or "data")were socially constructed through the interaction between the researchers and participants”*. Having carried out my work in Kenya to get an overview of the different aspects felt by the mobile operators i decided to carry out an interview with them to help gain an in depth understanding and to alienate my own assumptions.

Approaching my interview subjects i had already told them that I was working on my master thesis and therefore when we had the session scheduled it was not all tense and i was able to interact with them freely. Some even gave me a chance to still interact with them via E-Mail just in case i needed more clarification on anything discussed. From the interviews i was able to understand the views held by the mobile operators and how they handle certain issues that would arise. I also carried out observation in agents shops to be able to relate to everyday issues they encounter while serving customers and whether they (agents) are able to ensure the customer is saved from exploitation and is educated more. Observation offered a way to interact without necessarily interacting with the participants.

4. **The Principle of Abstraction and Generalization:** *“Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action”*. Chances of me drawing and generalizing the implementation and assuming that the M-Banking service is thriving in all the organizations was high. However when i got to collect my data through the interview this was not the case as some mobile operators were experiencing challenges especially in regards to distribution channels being at appropriate places more so in the upcountry areas.

Before carrying out interviews i approached my subjects via email in order to get the possibility of a chance to have a time to carry out the interview and as well to know where their view and experiences stand at. All this coupled with the observation exercise helped me apply them appropriately to understanding what lies beneath this service and certain aspects regarding operator views.

5. **The Principle of Dialogical Reasoning:** *“Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings with subsequent cycles of revision”*. When i look at this principle i real-

ize that as i carried my research i cannot entirely say i kept going back to the other materials to relate with my findings. Having worked with Safaricom i had prior understanding of the m-banking service and some of the strategies employed by the operator or even the other operators in the market but while carrying out the interviews while i was conducting the interviews i had to be careful to note down the views from the mobile operators and separate from my own ideas and opinions held which was hard.

Relating to the findings i was able to some degree eliminate misunderstanding i held that CCK was the main player in the m-banking service even though the regulator in the telecommunication industry the CBK has to approve any institution wanting to offer financial services in the country before the institution is given a license. As for CCK it has to ensure the policies entitled to the license are adhered to and has the mandate of protecting the consumer.

6. **The Principle of Multiple Interpretations:** *“Requires sensitivity to possible differences in interpretation among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study”*. In this research context it was not possible to find different versions of the story most probably this resulted from the fact that from the interviewed individuals all came from the regulatory and mobile money department. The information gathered from the two operators corresponded with each other and they shared almost similar views on several aspects. Even though due to time constraints i was not able to get views from the other 2 operators so the views would be from the 2 mobile operators that i would say represent the others.

7. **The Principle of Suspicion:** *“Requires sensitivity to possible “biases” and systematic “distortions” in the narratives collected from the participants”*. This principle is hard to relate to and i would not say i applied it.

Part IV.

The Case Study

Chapter 7.

Mobile Industry in Kenya

Kenyan telecommunications industry has grown from the days when the only form of telecommunication was through the fixed landline phones to now use of the mobile phone communication just like the rest of the world. This telephone service was also only offered by the then state owned Kenya Posts and Telecommunication Corporation (KPTC) and due to too much cabling the penetration to the rural areas of the country was hampered. Today apart from having telephony communication through fixed lines only we also have 4 mobile operators offering different kinds of services to the subscribers and this growth of the telecommunication industry can be attributed to the ICT growth in the country.

In the following sections i give a brief overview of the telecommunication industry in Kenya before i tackle the mobile phone network, the mobile operators their market share and strategies. Finally i discuss the telecommunication regulatory regime in Kenya.

7.1. Fixed Phone Network

Kenya Post and Telecommunication Corporation¹ which was a government owned company provided telecommunication and postal services in the country until it was split into 3 entities to ensure proper service provision and quality of service. These 3 entities are:

- Telkom Kenya providing telecommunications services
- Postal Corporation of Kenya to offer postal services
- Communications Commission of Kenya (CCK) a regulatory authority.

Telkom Kenya established in April, 1999 started offering the telephony services with mainly landline services connecting households and businesses and also internet services mainly through dial up access offered using the Internet Service Provider(ISP)Jambonet which is a subsidiary of Telkom Kenya². In July, 2004 the government liberalized the telecom market leading to new entrants increasing competition in the market with Local Loop Operators(LLOs)³ being licensed as well.

By 2007 TKL was fully privatized however during this period the fixed line network had 264,882 subscribers down from 309,379 in 2000 having a fixed teledensity of 0.9 per 100 inhabitants in 2007. The subscription level was declining and to increase the subscription TKL together with the LLOs started offering fixed wireless technology using CDMA but there was still growth expected. From statistical report Q1'2011 however, the fixed network

¹The Kenya Posts and Telecommunication Corporation (KP&TC) Act was enacted in 1977. It filled the vacuum left by the East African Posts and Telecommunication Act, which was replaced upon the collapse of the East African Community. The KP&TC was historically vertically integrated into postal services, telecoms services and regulatory functions. As regulator, provider of telecom services and owner of the telecommunications infrastructure, the KP&TC locked out competitors. The resulting inequity in the sector manifested in exorbitant fees charged to competitors and consumers, and limited regulatory oversight from the Government.

²[HTTP://www.telkom.co.ke/](http://www.telkom.co.ke/)

³The Local Loop operators are small operators with nation wide license to complement the fixed line services and complete the last mile. However, their license condition limits their on-net traffic to a geographic district and any traffic from one district to another can only be through major operators (fixed and mobile).

subscription has declined but the usage levels of fixed to mobile traffic increased. The decline is attributed to the vandalism of the copper wires and the entrant of the mobile telephony with many preferring mobile telephony^{4,5}.

7.2. Internet Connectivity

When the telecommunications market in Kenya was liberalized in 1999 more players entered the market to offer ICT services which was initially monopolized by TKL. Internet Service Providers (ISPs) were licensed while TKL was given the monopoly to operate the internet backbone as well as the provision of access circuits (leased lines, VSAT, etc) for 5 years until July 2004. Internet coverage however was mainly in the urban areas with quality of services provided being below average but with the new entrants the ISPs this was changed and the network coverage was expanded further⁶.

Operators and service providers of internet being part of the communication industry are regulated by the Communications Commission of Kenya (CCK). These providers are :

- Gateway operators-Operate international gateway and are the main providers of Internet connectivity to the country through satellite-based earth stations. They include the Internet Backbone and Gateway Operators (IBGOs) and VSAT operators.
- Access infrastructure operators- Provide in-country communication links and they include public data network operators (PDNOs), mobile operators, local loop operators (LLOs) and VSAT network operators.
- Applications providers-Provide services, content and all other related applications to the end users. ISPs are in this category.

⁴More information can be found in www.cck.co.ke and Strategic Plan 2008 – 2012 Towards a Knowledge Based Economy at [HTTP://www.information.go.ke](http://www.information.go.ke)

⁵Statistical Report Q1'2011: [HTTP://cck.go.ke/resc/statistics](http://cck.go.ke/resc/statistics)

⁶Internet Market analysis Final report 2007: [HTTP://www.cck.go.ke/resc/downloads/](http://www.cck.go.ke/resc/downloads/)

Chapter 7. Mobile Industry in Kenya

The growth of internet market in Kenya according to the 2007 internet market analysis report was growing at a slow pace and this was due to: High costs of internet services making it unaffordable to many; Regulatory and licensing framework for instance there was no unified license issued; Unfair competition and business practices in the market e.t.c. This has however changed and there is a wider population of internet users⁷ which can be due to the fact that more players joined the market ensuring there is a wider internet coverage. The regulator has also been actively updating the guidelines and fees and in 2008 it migrated to Unified Licensing Framework(ULF) eliminating certain bottlenecks affecting the growth.

Recently the internet market has grown with many subscription being registered apart from ISPs offering the services people now access internet through their mobile phones with the different technologies available be it EDGE/GPRS or the current 3G. The laying out of the fiber optic cable and WiMax services is also a plus to the growth. According to CCK statistical report Q1' 2010/2011 there are 8.69 million estimated internet users (Table 7.1 .) however most of the growth is attributed to mobile phone use accounting to 98.8% of the total internet subscription⁸ .

⁷Internet users is estimated by multiplying by 2 the number of mobile data/internet subscriptions, by 10 terrestrial wireless subscriptions, and by 100 fixed DSL, Fiber optic and satellite subscriptions. There is no scientific method of estimating internet users; for the purpose of this report the methodology adopted is borrowed from the internet market study 2006 of CCK

⁸[HTTP://www.cck.go.ke/](http://www.cck.go.ke/): Sector Statistics Report Q1.2010/2011

	Q1' 01/11	Distribution of subscription type (%)	Q4' 09/10	Quarterly variation (+/-)%	Q1' 09/10	Annual varia- tion (+/-) %
Total internet subscriptions	3,230,023	100	3,096,952	4.3	1,880,115	71.8
Terrestrial mobile/data subscriptions	3,192,667	98.8	3,059,906	4.3	1,864,991	71.2
Terrestrial wireless data/internet subscriptions	15,907	0.49	22,134	-28.1	1,687	842.9
Satellite data/internet subscriptions	839	0.23	953	-12.0	1,598	-47.5
Fixed DSL data/Internet subscriptions	12,216	0.38	9,631	27.1	8,299	47.2
Fixed fiber optic data/internet subscriptions	8,369	0.26	4,303	94.5	3,540	136.4
Fixed cable modem data/internet subscriptions	25.0	0.00077	25	0	-	-
Estimated Internet users*	8,689,304		7,832,352	10.9	3,746,580	131.1

Source: CCK Statistics (-)data not available

Table 7.1.: Kenya Internet Subscriptions

7.3. Mobile Phone Network

The mobile industry has grown from duopoly market to now having 4 operators pushing the growth further more than the fixed network in the country. As part of the license issued to mobile operators they were obliged to provide certain population coverage; failure to adhere to this requirement they would not be granted the license⁹ and this has ensured that the growth of the mobile network is countrywide.

⁹Luca Manica and Michele Vescovi: Mobile Telephony in Kenya...is it "Making the life better"?: https://www.it46.se/projects/UNITN_ict4sd/assignments/ICT4SD_manica_vescovi.pdf

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In the statistics¹⁰ report in 2008 the mobile growth network over the last 5 years period of 2003-2008 had registered over 60% annual growth with over 11,986,007 subscribers at the end of March 2008 representing a penetration of 35.25 %. The penetration has since been increasing even more than what was fore-casted with the 4 mobile service providers driving competition to making the service more affordable to many. As of today from statistics report of Q1' 2011 the mobile subscription stands at 22,033,668 million subscribers with Safaricom having the largest number of mobile subscription at 16,714,548. However as the industry grows the penetration rate is still low which was reported at 55.9 per 100 inhabitants below the world average of 67.0 per 100 inhabitants¹¹. The statistics are as summarized in Table 7.2 .

Mobile Service provider	Subscriber base			Growth rate(%)	Market share (%) Q1 10/11	Market share (%) Q4 09/10
	Q1 10/11	Q4 09/10	Net additions			
Safaricom	16,714,548	16,240,569	473,979	2.9	75.9	80.7
Airtel	2,977,696	1,834,343	1,143,353	62.3	13.5	9.1
Essar Telecom(Yu)	1,465,832	1,492,098	-26,266	-1.7	6.7	7.4
Orange	875,592	552,294	323,298	58.5	4.0	2.7
Total	22,033,668	20,119,304	1,914,364	9.5		

Source: CCK, operators returns

Table 7.2.: Mobile subscriptions 2011

Drivers for mobile phone growth

The growth of the mobile industry can be attributed to :

1. Government Initiatives -The government liberalized the telkom industry and allowed many players to come to the market, it also has reduced the license fees. Other initiatives include approval of number portability service, migrating to unified licensing

¹⁰Statistics are drawn from Statistical reports 2008 and 2010 from [HTTP://www.cck.co.ke](http://www.cck.co.ke).

¹¹International telecommunication union, Measuring the information society 2010

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framework regime e.t.c. all these have made it possible for the mobile industry to grow.

2. Stable Regulatory Environment - The independent regulatory board ensures that there is fair competition among the operators and the tariffs set are not fully government influenced. The tariffs as well were reduced further in August 2010 when CCK reduced the interconnection rates by half¹² and as such increase in mobile subscription use as the call and sms charges were lowered by the operators according to the CCK directive.
3. Improving Infrastructure - The network infrastructure has been improved to cover wider geographical area. Some operators even share the network infrastructure on agreed terms and this helps in reaching many.
4. Changing Consumer Behavior-From the basic use of the phone for voice to use of the phone for different services like the internet. Most operators have favored the prepaid service than the post paid service and thus consumers are able to use the mobile phone according to their means and thus subscription levels increase. The prepaid service offers the consumers with flexibility with low denomination vouchers thus allow many to use the mobile phone and its services and it also helps them avoid post-payment credit problems.
5. Cheap phones- Most of the network operators have managed to offer very cheap phones so as to attract those who cannot afford high end phones. The phones prices would even go as low as KES.1200 this was after the government removed taxes on handsets.
6. Loyalty program- The loyalty program rewards subscribers with phones according

¹²According to Interconnection Determination No. 2 of 2010 dated today, the Commission reduced mobile interconnection rates from the current Kshs4.42 per minute to Kshs2.21, representing a 50 per cent drop. The rates will progressively decline by 35%, 20% and 15% annually in 2011, 2012 and 2013 respectively to stand at Kshs0.87 by 2014

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to how much money they have spent whether on voice or data services. The accumulated points are also used to give subscribers with free talk time or phones or text messages.

7. Mobile Money Banking - The ease to which money can be transferred at low costs makes this an attractive way of getting more people to subscribe to use of the mobile phone and with the possibility that it can be connected to ones bank account such as Equity bank makes it more attractive for one to subscribe to the service.
8. Mobile Internet Since most of the Kenyan population do not have internet in their homes or they are always on the go they prefer use of internet on their mobile phones from business use to social use(social networking sites). When it comes to business most people have their work E-mail configured to their smart phones so as to always being available when needed.

Mobile operators in Kenya

7.3.1. Safaricom Limited

Safaricom started mobile services operations in 1993 based on an analogue ETACS network and was later upgraded to GSM in 1996 with the license being awarded in 1999. Its ownership was between the Government of Kenya(GoK 60%) and Vodafone UK(40%) thus under the State Corporations Act (Chapter 446) Laws of Kenya it was a state corporation until December 2007 when 25% of Safaricom shareholding was sold to the public¹³. This IPO was the largest ever in East Africa raising over KES50 billion (about US\$800 million) for the Government and in march 2008 ownership changed thus the GoK ceased to have a controlling interest in Safaricom¹⁴.

¹³Safaricom homepage: [HTTP: www.safaricom.co.ke](http://www.safaricom.co.ke)

¹⁴Infrastructure advisory services success story: Kenya telecom: [HTTP://www.ifc.org/](http://www.ifc.org/)

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Safaricom operates on GSM-900 and GSM-1800 technologies for voice services, 3G technology using UMTS technology while still offering broadband services using WiMax and fiber optic cable. To offer 3g services Safaricom had to acquire the license which was issued in 2007 at a fee of USD 25 million and this was an enhancement to the previous GSM license issued in 1999 for a period of 15 years. Being the first to acquire 3g license Safaricom capitalized this to offer many services to customers and this increased the subscriber base.

According to Safaricom's annual report 2010 most of its growth had been in the voice services and as such to increase the growth in its data services certain steps were taken. These steps included ¹⁵:

- Investment of 22.5% stake in The East Africa Marine System (TEAMS) undersea as well as investing in Seacom undersea cable.
- Acquisition of 100% stake in Packet Stream data Network limited adding capacity to the existing Wimax business services.
- Roll out of an extensive 3G and Wimax network.
- Strategic partnerships to provide inter-city as well as metro fiber connectivity.
- Leasing of fiber optic capacity from the national power provider Kenya Power & Lighting Company (KPLC) e.t.c

As at August 2010 Safaricom signed a 3 year contract with a Chinese Company Huawei technologies to roll out Next generation Long Term Evolution (LTE) at a cost of KES.12 billion, with doing a technical trial before commencing with the commercial trial. The 4G technology is expected to use the analogue frequencies that have been left idle with the shift to digital television by 2015, however the 4g spectrum has not been issued¹⁶. When

¹⁵More can be found in annual report 2010 found at Safaricom website. [HTTP://www.safaricom.co.ke/](http://www.safaricom.co.ke/)

¹⁶ITNewsAfrica: [HTTP://www.itnewsafrika.com/?p=9078](http://www.itnewsafrika.com/?p=9078)

it comes to the market share it is still the leading competitor in the market with 75.9% even though it is a drop of 4.8% from the previous quarter it had net additions of 473,979 with its subscriber base still growing¹⁷. More on Safaricom achievement can be seen with the several awards gotten (see Table 7.3) and it aims to be the the market leader in all its services and innovations^{18,19}.

7.3.2. Airtel Kenya

Airtel Kenya the second largest mobile operator in Kenya having market share of 13.5% according to statistical reports Q1'2011(Table 7.2) has seen quite a lot of changes from its ownership to the change of names. It was originally known as KenCell as it entered the Kenyan market in 2000, changing to Celtel Kenya in 2004, Zain Kenya in 2008 and when it was bought out by Indian's telcom Bharti Airtel the name was changed to Airtel Kenya in October 2010²⁰. During its operation as Kencell it was owned and managed by Sameer Group, local entrepreneur Naushad Merali's investment company and Vivendi, however in 2004 due to technology crash of 2002 the company went into bankruptcy which saw Vivendi pulling out of the firm and decided to sale its stake of 60%. Dutch-based Celtel won the bid over South Africa's MTN and paid Vivendi Universal \$230 million for its 60% stake thus the entry of the celtel name to the Kenyan market^{21,22,23}.

In September 2007 Celtel international rebranded Celtel to Zain after it was sold to Kuwait based MTC group in a move to re-invent itself in the Kenyan market with a global brand. This change of name was too soon as the celtel brand was still new even the pay phone booths were still marked as KenCell but this did not stop the re branding. MTC group

¹⁷Q1'2011 statistical report from CCK website: [HTTP://www.cck.go.ke](http://www.cck.go.ke)

¹⁸More information in several publications in Safaricom homepage [HTTP:// www.safaricom.co.ke](http://www.safaricom.co.ke)

¹⁹Information on the wards gotten from GSMA website [HTTP://www.gsm.com](http://www.gsm.com) and different operators reports in their sites.

²⁰[HTTP://wirelessfederation.com/news/tag/kencell/](http://wirelessfederation.com/news/tag/kencell/)

²¹[HTTP://in2eastfrica.net/ownership-changes-leave-merali-as-face-of-kencell/](http://in2eastfrica.net/ownership-changes-leave-merali-as-face-of-kencell/)

²²[HTTP://www.totaltele.com/view.aspx?ID=383768](http://www.totaltele.com/view.aspx?ID=383768)

²³[HTTP://allafrica.com/stories/200405281031.html](http://allafrica.com/stories/200405281031.html)

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being a major mobile operator has operations in six Middle Eastern and 14 sub-Saharan African countries²⁴. By August 2008 Celtel was officially re-branded to Zain unfortunately Zain Africa business did not do so well and they suffered huge net losses in the Q1' 09.

March 2010 the Zain Africa business was sold to Indian Bharti Airtel at a cost of US\$10.7 billion and of course this meant change of name for the mobile operator again ²⁵. Zain Kenya was fully rebranded to Airtel Kenya in October 2010 after being bought out. On network expansion; Airtel Kenya acquired a 3G license in July 2010 after paying USD10 million lower than what Safaricom paid for after CCK lowered the price by 60% to allow more mobile operators to acquire it. It is expected that it will roll its 3G services in the first half of 2011.

²⁴[HTTP://wirelessfederation.com/news/9598](http://wirelessfederation.com/news/9598)

²⁵[HTTP://www.zain.com/press releases](http://www.zain.com/press_releases)

Year	Award Given
2011	<p>Awards won at GSMA Global Mobile World :</p> <ul style="list-style-type: none"> • Mobile Business & Enterprise category Best Mobile Money Product or Solution(Airtel Africa MasterCard Worldwide and Standard Chartered Bank for Airtel card for Online pay services) • Best Mobile Money for the Unbanked Service-Safaricom(M-Pesa) • Best Customer Care & Customer Relationship Manager solution called Airtel Treasure Hunt (Airtel Africa) • Best Mobile Technology for Emerging Markets -Orange (Orange solar base station programme)
2010	<ul style="list-style-type: none"> • GSMA Global Mobile World-Best mobile money service (Safaricom M-PESA (bulk payment & utility bill) extension to service)
2009	<ul style="list-style-type: none"> • GSMA Global Mobile World- Winner best Mobile money Service (Safaricom & Vodafone)
2008	<ul style="list-style-type: none"> • Global Mobile World- Winner best commercial category of M-Pesa “Send Money Home” • Kenyan Banking Awards product innovation category (M-PESA) • UN world business and development Award among 10 private companies for contribution to achievement of mdg through M-Pesa • Stockholm Challenge-Winner Economic development category(M-PESA)

Source: GSMA

Table 7.3.: Awards won by Mobile Operators

7.3.3. Orange Telkom

Orange telkom gets its footing from Telkom Kenya which was established in April 1999 as a telecommunications operator under the Companies Act to be an independent company. Prior to 2004, Telkom Kenya (TKL) was the sole provider of fixed line services in Kenya and being the national only telecommunications operator then ; it was mandated to offer

universal access on data, voice and Internet services in the country.

In the process of privatization,TKL was sold to France Telecom who won a bid to acquire 51% of Telkom Kenya's shares in November 2007 and at the same time it was issued a GSM license to offer mobile services with services expected to be rolled out in the next financial year 2008. In 2008 France Telcom Group rebranded the name to Orange to make it have a fresh new look that is attractive ^{26,27}.

Orange Kenya operates on the GSM network while still offering fixed wireless services on the CDMA technology with a name Telkom Wireless. Due to lack of network infrastructure while starting out to offer mobile services Orange used Safaricom's infrastructure to ensure there was a nationwide network coverage expecting to build its own infrastructure within 2 years of being in operation. In November 2010 CCK awarded 3G license costing USD10 million to Orange which would be operating on CDMA2000 technology with the services expected to be commercially rolled out in the first half of 2011 ²⁸.

7.3.4. Essar telecom

Essar Telecom Kenya Limited (ETKL) is a unit of India based Essar Group which came into existence as Econet wireless in Kenya and was issued GSM license in December 2003 however with the long court battles its roll out of the services were delayed²⁹. The battle was due to the controversy that existed with one of its partners KNFC(Kenya National Federation of Cooperatives) holding 30% stake in the partnership being unable to raise the money required to pay as part of the license fee .In 2006 however, the high court finally ruled in favor of Econet and it was given a go ahead to take the stake held by KNFC or get new partners in the venture.

²⁶[HTTP://cck.go.ke/resc/publications/annual_reports/CCK_Annual_Report07-08.pdf](http://cck.go.ke/resc/publications/annual_reports/CCK_Annual_Report07-08.pdf)

²⁷[HTTP://www.telkom.co.ke/](http://www.telkom.co.ke/)

²⁸[HTTP://www.itu.int/ITU-D/ict/newslog/](http://www.itu.int/ITU-D/ict/newslog/) France telcom

²⁹[HTTP://www.essar.co.ke](http://www.essar.co.ke)

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In January 2008 Econet managed to pay US\$27 million to CCK for the license to operate, this was after Africa's Econet Wireless International (EWI) sold its 49% shareholding to India's Essar Communication Holdings(ECHL) in order to get funding for the license and clear the shareholding dispute. Essar thus committed to provide US\$ 500 million for the roll out of operations by EWK in the Kenyan Market.

In statistics report Q4' 08/09 Essar entered into an agreement to share infrastructure with Zain(Now Airtel) to help in reducing the costs of laying out their own. Finally in November 2008 Econet launched its mobile services trading as Yu brand in the capital city Nairobi followed by Mombasa while expecting to have nationwide coverage in 4 months period³⁰. In its quest to expand the network India's Essar Group bought Econet wireless holding and Essar telecom Kenya was now the major shareholder in the company with 80% stake³¹.

Having taken sometime for the Yu network to come to the market it is still the 3rd largest mobile operator in the country with a 6.7% market share and having a subscriber base of 1,465,832 although due to the price wars the market share reduced from 7.4% in Q4' 09/10(see Table 7.2). More is expected in the growth of services with Essar and as at January 2011 Essar was planning to extend the infrastructure sharing plan they have with Airtel to acquire more infrastructure as they continue to expand their services and offer more with its voice and 2.5G data network ³² ,³³.

³⁰[HTTP://cck.go.ke/resc/statistics/Sector_Statistics_Report_Q4_2008-09.pdf](http://cck.go.ke/resc/statistics/Sector_Statistics_Report_Q4_2008-09.pdf)

³¹Information gotten from Cellular news with tags Econet-wireless/ Essar telecom Kenya.[HTTP://www.cellular-news.com](http://www.cellular-news.com)

³²[HTTP://www.businessdailyafrica.com/essar](http://www.businessdailyafrica.com/essar)

³³Essar interchangeably referred to as Yu

7.4. Strategies and services

Different mobile operators employ different strategies in order to stay afloat and make it profitable in the long run. These strategies employed are ^{34,35,36}

- Attracting Customers:
 - Airtel reduced its call rates to as low as KES.1 in their latest promotion of “Feelanga free with Airtel”. “Feelanga” is Sheng for feel, with this subscribers call for Kshs1 across all networks from 6pm to 6am everyday. Yu has Zaziada promotion that customers get double airtime for each bought.
 - Safaricom offers low cost handsets, lowest denomination recharge voucher of KES.5 and it also allows customers to earn double bonga points in the bonga loyalty program.
- Data Promotion:
 - Safaricom introduced lowest data bundles in the market, reduction of blackberry monthly internet subscription as well as aggressive selling of affordable data enabled devices.
 - Safaricom and Airtel have partnered with Gmail to offer sms based chat service. Safaricom partnership with Nokia to offer NMS(Nokia Messaging Service) a social networking service drives data usage.
- Advance Credit
 - Safaricom “okoa Jahazi” and Airtel “kopa credo allows subscribers to borrow credit from the operator and thus allow many to use their phones even when they have no money.
- Infrastructure Sharing & Network Expansion

³⁴[HTTP://www.biztechafrika.com/section/mobile/article/m-pesa-meets-debit-cards/447/](http://www.biztechafrika.com/section/mobile/article/m-pesa-meets-debit-cards/447/)

³⁵Info gotten from mobile operators website

³⁶[HTTP://www.itnewsafrika.com/2010/09/nokia-safaricom-in-social-networking-partnership/](http://www.itnewsafrika.com/2010/09/nokia-safaricom-in-social-networking-partnership/)

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- Essar(Yu) in partnership with Airtel share infrastructure to reduce the operational costs and this has helped them with their growth.
 - Orange also shared Safaricom's infrastructure to help in countrywide roll out.
 - Safaricom is investing in continued roll out of 3G and Wimax sites as well as evolving to 4G.
- Roaming in East Africa
 - Safaricom and Airtel allow its subscribers to roam in East Africa while enjoying tariffs as if they are in their home country.
 - Mobile Banking- This strategy is being employed by all the operators but mostly Safaricom is on the forefront with its innovative services recently having introduced Safari Visa prepay debit card in conjunction with I&M bank . Mpesa users can load the card via their mobile phones, which in turn allows them to shop online, pay for hotel accommodation both locally and internationally, and purchase goods and services as well.

Services offered by different operators

All the mobile operators offer the basic mobile service of short message service(sms) and voice call services(Local and roaming) however some have emerged with offering services of high quality and that can be attributed to the kind of technology employed by each. These services are highlighted below:

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Service Offered	Mobile Operator & Service
M-Banking	<ul style="list-style-type: none"> • All Operators-Safaricom(Mpesa), Airtel(Airtel Money), Yu(Yu Cash)& Orange(Orange Money)
Corporate Businesses	<ul style="list-style-type: none"> • Safaricom- Cloud computing, Data centre and Hosting, Conferencing (Video & Voice), Telepresence, International Wholesale. • Safaricom, Airtel&Orange- Enterprise internet Connectivity • Safaricom&Airtel -Blackberry Services(BIS&BES) Orange- Offering Iphone services
Value Added Services	<ul style="list-style-type: none"> • All Operators- Messaging(mms, chat via text), Caller Back RingTone(CRBT) • Safaricom, Airtel & Essar- Information Service • All Operators- Credit transfer to another user while Safaricom has as well Advance credit (Okoa Jahazi) service where you can borrow credit from the operator payable in 72 hours. • Safaricom- Personalized music service such as I-Dj tunes, MXit • Airtel- Global top up that allows people abroad to directly top up someone's line in Kenya • Safaricom & Airtel- Choosing own preferred number. • Essar- Moved allows your contacts to be informed if you change your number.
Mobile Internet	<ul style="list-style-type: none"> • All operators- Safaricom on 3g network, Yu on 2.5g while Airtel and Orange to launch 3g by end of Q1'2011.

Table 7.4.: Services Offered by Kenyan Mobile Operators

7.5. Legal and Regulatory Framework

The Telecommunication industry in Kenya is being run and controlled by the Kenya Communications Act (KCA) that came into effect in February 1999. This act replaced the KPTC Act of 1977 which was used in the East African Community for the role of East African Postal and Telecommunication Corporation providing governance in telecommunication industry in East African countries; Tanzania, Kenya and Uganda. KCA having being in a liberalized market; to be able to carry out its duties properly decided to break KPTC into 3 entities as discussed in section 7.1 with CCK created as an independent regulator.

In order to include broadcasting and ICT services into the 1998 KCA ,the bill was amended in 2008 and made into law in December 2008 with the act being in operation on 2nd January 2009 as the Kenya Communications (Amendment) Act 2009. This act is now known as Kenya Information and Communications Act, 1998 (KICA).

7.5.1. Communication Commission of Kenya

Through Communication Amendment Act 2009 the CCK is a converged regulator with the responsibility for facilitating the development of the information and communications sectors (broadcasting, multimedia, telecommunications and postal services) and electronic commerce. The roles of CCK with respect to the telecommunications sector include:

- Telecommunications licensing and monitoring the activities of licenses to enforce compliance with the license terms and conditions as well as the law. Type-approving communications equipment and managing the radio frequency spectrum.
- Promotion of investment and provision of international transit services - Encouraging private investment and provision of international transit services by persons providing telecommunications services in Kenya.

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- Universal Service Obligations to ensure the availability of telecommunications services to all citizens throughout the country
- Tariff Regulation -Develops pricing guidelines for service providers in order to ensure service affordability.
- Ensuring fair competition
- Protecting consumer rights

Initially licenses were based on the service being provided and/or technology adopted to provide such services with categories such as National Fixed Network Operator, GSM Mobile Cellular Operators, Mobile Satellite Operators, Data Carrier Network Operators e.t.c. This process was long and tedious and one was required to have many licenses to operate but in 2009 CCK migrated to Unified Licensing Framework(ULF). Through ULF the licenses are service and technology neutral thus allow operators to invest in technologies that offer converged services and it is structured into 5 categories:

1. Network Facilities Provider
2. Application Service Provider
3. Content Service Provider
4. Submarine Cable Landing
5. International Systems Provider license added.

Other associations

Service operators created an association that help them in voicing their issues to CCK and other regulatory authorities involved in order to ensure that there is a level playing field

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in the telcom industry. The most known association is Kenya Telecommunications Network Operators Forum (KTNO) with members from a broad range of telecoms's service providers including Safaricom, Airtel, Telkom Kenya (Orange), Jamii Telecommunications Limited, Kenya Data Networks Limited, Flashcom Limited and Popote Wireless Limited. KTNO deals with issues such as taxation, spectrum management, regulatory development e.t.c.

CCK has also decided to ensure it discharges its duties effectively especially to increase competition has taken certain initiatives involving approving Mobile Number Portability service to start in April 2011; Spectrum pricing reform by engaging external consultants to evaluate the current spectrum charging methodology and engaging in countrywide Subscriber registration ³⁷.

³⁷All information on Legal and Regulatory framework is gotten from CCK website ([HTTP://www.cck.go.ke](http://www.cck.go.ke)) as well as Mobile operator publication reports on their individual sites.

Part V.

Discussion and Conclusion

Chapter 8.

Discussion of the Results

I will present and discuss the results of my research in this chapter. The discussion will be centered upon the identified themes as per the research questions 6.1 and when it comes to interview results the full transcriptions will be found in Appendix B . The identified themes are:

- Strategies and policies that aid m-banking service (*RQ1.1*)
- Challenges faced by m-banking usage (*RQ1.2*)
- User experience and how it can be improved by use of agents (*RQ1.3*)

8.1. Strategies and policies that aid m-banking service

This theme is to enable me tackle *RQ1.1* which deals with analyzing the strategies and policies in place that help in the growth of the m-banking service and this would mainly target the mobile operators. I carried interview with the operators and from the questions relating to policy implementation both Airtel and Orange Kenya felt that the process is a straight forward one and once the policies have been passed by the CCK the operators are required to implement them while they look for other avenues to maybe appeal¹. Regarding

¹Appeal process could take as long as 1 year

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tariff regulation policy the operators feel it needs to be reviewed as it is not flexible and in the spirit of competition it hinders a level playing field and the big players² in the market benefit more. Airtel on the other hand with a strategy of getting the mass market make their tariffs as low as they can to attract the customers. This strategy however has not worked so much in the Kenyan market as Safaricom still having the highest tariffs with m-banking has many subscribers therefore the operators have to be innovative enough to create useful and practical services to attract the customers.

Agents exclusivity from the CCK point of view is to protect the interest of the innovator of the service(Safaricom) as denying them this would mean unfair practices for them. Due to this fact other players in the market have to ensure that they have their agent network coverage throughout the country to help in the growth or they will suffer less expansion of their service for instance Airtel suffers from this. They are having difficulties to offer the service to many due to low distribution of the agents in the countryside. Customers want to access this service close to them as they can therefore the agents presence makes it easier for them. Consumer protection policy is important and the operators use several strategies to do this through KYC(Know Your Customer) registration and ensuring the agents adhere to this they organize impromptu visits to the shops to ensure that the agents follow the rules and regulations set aside. They use mystery shoppers who pose like customers and would ask questions like a customer and as well they observe everything going on in the shop³. Another strategy that has worked for mobile operators is availability of the service by partnerships with banks to offer value added services and continuous customer education.

From my observation exercise i noticed that not all agents are offering m-banking services strictly they do offer mobile services but in most of such shops they had 2 assistants in place

²Big players in the market are Safaricom and Airtel with having large subscriber base and market share of 69.9% and 15.2% respectively as per statistical records of Q2 10/11 released in May 2011.

³Mystery Shoppers are people assigned to visit the agent shops and pose as customers without revealing their identity and mostly are staff from the mobile operators. They come and seek services as normal customers and this is done to keep the agents at check and ensure they carry out their duties as per stimulated requirements in their contract.

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thus one would attend to m-banking customers without causing delays. With exception of a few most assistants were quite friendly and in one particular instance though the assistant was very rude. In this case a customer walked in an orange agent shop (Luthuli Avenue) and she was not so keen to look at the tariff guide on the wall requests for assistance to withdraw money she asks “*How much does it cost to send KES. 10,000 to a non registered Orange cash person?*”. The agent continues to do other things and ignores the customer and when the customer asks again she answers “*Cant you see the tariffs posted on the wall or you cant read ?*”. I believe this is where mystery shoppers come in handy as discussed above.

CCK sector regulations and the Electronic Retail Transfer and E-Money regulations document by the CBK contain regulations with mobile banking which is considered as a non bank led model⁴ of issuing electronic money transfer. Prior to when Mpesa services was started in 2007 there were no clear policies and regulations on e-money issuance by mobile operators apart from the ones imposed by CCK. In 2010 CBK governor agreed in amendment of the regulations instead of creating more thus the regulations analyzed are those that became effective in 2011. Some things to note are documentation of records to be maintained up to 7 years period, agents to be trained to allow for provision of e-money services and their locations have to be put in a public electronic register. These rules do help a lot for customers to locate the agents easily and documentation helps in trail of records and for instance for clearing complains that would come during transacting. There were no specific rules for agents but these had to be imposed by the operators themselves with regards to the license of operation. These policies keep check of the operations of the e-money issuers and there are tough consequences if not adhered to.

According to CGAP(2010) focus note on regulatory approaches to protecting Customer fund it discusses regulations that involve issues such as permitting e money issuers to pay interest on e-accounts held in the context that they bring many unbanked population and

⁴Non bank led model issues electronic value and holds matching value assets in pooled account in regulated bank (Trust account)

would be used for savings in future; funds backing e-float be covered by deposit schemes apart from the mobile operator it should extend to customer balances; creation of a regulatory scheme like for banks being liable to their agents ensuring a level playing field for non bank led e money issuers(Mobile operators).Leeway in these regulations see the mobile operators use it to their advantage while offering the m-banking service knowing that they are not strictly governed but they do keep their agents in check using mystery shoppers⁵.

According to the National ICT policy document mobile phone technology falls under the telecommunications policy and this is what governs the operations of the mobile operators in any service offered. The Policy document being used is the one published in 2006 although it has had several modifications along the way. The policy indicates how telecommunication is seen as a key to increase growth in ICT in the country and outlines clearly defined vision, strategy, guidelines, procedures and rules on how to manage such entity as a whole. The policies are not strict and since they are governed by an independent regulator (CCK)the players in the market feel they are well covered.

8.2. Challenges faced with m-banking usage

There is no doubt that with any service there are always challenges that come with it and with m-banking service there is no exception.Mobile operators as the providers of these service have to handle the problems that come with the usage of the service because without handling such problems exhaustively they may end up crippling the service.From the interview when it comes to security issues involving cases of fraud, loss of service and privacy the operators have put measures like working with different departments. They have a risk and fraud department in conjunction with the police that would follow up on

⁵The Terms “e-money” as defined in the E-money Regulation is money stored electronically; “e-money issuer” means an entity authorized to issue e-money in terms of the E-money Regulation in this case the mobile operators; “agent” means a person appointed by an e-money issuer to perform agency services on its behalf and “E-float” is money stored electronically and held in customers mobile phones as well as the agent phones.

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such cases of fraud ; the police deal with the perpetrators in the legal way. If the fraudulent activity was done by the employee the mobile operator does lay off the staff once the staff is discovered doing such. There are at times when the system maybe at fault where it fails and certain services are not executed well and in such cases if a customer loses any funds they are compensated accordingly. Orange respondent also mentioned the importance of adhering to the consumer protection regulation stipulated in the license.

At times it is not easy to have all the tariffs for transacting in any customer's mind and when we look at the setup of agents shops through the observation (See Figure 6.2) all the agents have the tariff guide displayed in the shops as well as the terms and conditions of service. This is a rule that is in the license issued to the agents and this helps the customers from being conned out of their money while transacting and as well by having the agent number there helps in follow up if any issue arises.

Looking at the sector regulations from CCK they highlight the different regulations and the consequences if not adhered to and they do work hand in hand with CBK when it comes to e-money issuance by the mobile operators. Under section 5 in consumer protection guidelines the service provider has to establish a customer care system within which customers can make inquiries and complaints concerning its services. Most operators operate the customer service for 24 hours to help customers and have adhered to this regulation and as well the complaints have to be resolved within a reasonable time. Under the rights and obligations of consumers section 4 customers have a right to receive all the information relating the service and any risks associated with it and for this the mobile operators enforce through the agents and at the same time it is upon the operators to continuously educate the customer.

8.3. User experience and how it can be improved by use of agents

User experience is very important in successful deployment and issuance of services to the consumer of any service. In the Consumer Protection Diagnostic Study by FSD(2011) they have tackled regulatory concerns that deal with the mobile e-money issuers as well as consumer experience. Key points to note:

1. Customers are ideally comfortable with the services offered but they still do encounter problems like sending money to the wrong recipient through entering the wrong phone number and not all of them are able to recover these funds, agent defrauding the customer by observing a regular customer's account while transacting with them e.t.c. 61% of respondents say they have not encountered a problem using mobile payment service.
2. Popular to the believe that m-banking services are mostly used by the unbanked the survey shows that users use it to their existing financial services. Kenyans tend to use a mix of products and services both formal and informal to meet their financial needs.
3. High user experience is attributed to ease of reach to assistance if needed and the tariff guide for transacting is easily displayed for the customers.
4. Comparison to old & still existing money transfer services over 95% of users found that mobile payment services were faster, more convenient, safer and cheaper with agents being close by.

Even though the FSD(2011) covers a lot of M-pesa users it gives an overview of the mobile payment service in Kenya and the general view of the experiences held by the customers as the rest of the mobile operators came up with the product after studying Safaricom's

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usage pattern and the innovation. The user having good experience with the service drives the provider to offer more services and as such we can see that at the time of the survey use of the service was entirely for payment and transfer of money but now this caters for: Payment of bills through partnership with several organizations; linking with a bank account (Equity Bank Kenya) initiatives like M-Kesho (Safaricom), Iko Pesa (Orange) and Yu cash; buying goods and making payment using the Mobile account; bulk payments enabling organizations to disburse funds to many people widely disbursed in the field and mobile ticketing service.

When it comes to agents they can assist the mobile operators in ensuring that the customers have good experience by educating customers on several issues. From my observation exercise most of the agent assistants were not keen to educate the customers but just handed them the pamphlets that had lots of information for one to even read. Having picked one of them yes it was full of very important information but the agent should cater for all because not all customers can read and write. The agents need to be trained to act and behave politely to all the customers displaying tariff guide is not enough so the agent assistant can as well advise the customer accordingly about the tariff if the customer is not able to see the tariffs. Continuous impromptu checks also helps.

According to recommendations mentioned in the FSD(2009) like consumer information communication campaign, agent training and monitoring, improved complaint process and complaint monitoring there has been a growth in the positive step as when this was put to practice the experience with usage of the m-banking service has grown. In 2009 there were 40% of the Kenyan population using the service but now there are about 84% (FSD 2011).

Chapter 9.

Conclusion

From the results i have only tackled the m-banking service that is widely used in Kenya and we can see that given the right environment and the regulations in place the service will continue to thrive. The regulatory regime as well is not strict and since mobile phone technologies fall under the ICT policies with the one of the objectives being to “*Creating a modern and efficient telecommunications infrastructure in order to position Kenya as a hub of industrial, commercial and financial services in the region*”. Thus the policies are drafted in a such a way that give room for innovations and the license terms are made clear for the operators to follow the regulations. User experience according to FSD reports keeps growing and with several other services being created everyday the users find it more easy to use the m-banking service.

Due to competition in the mobile sector in Kenya it is not only the tariff structure that drives users to the service but what other enhanced services the user can get thus the operators have to be innovative enough to attract the users.It is also very evident that the mobile operator has to rely on its agent network distribution for the success of the service and therefore it would only be fair if clear regulations exists towards them. Even through the CBK regulations none exists but they propose change in the regulation to cater for them.

Without the ICT and technological growth in the right direction the m-banking service would not be a thing that would be thriving so much in Kenya and i would definitely say there are many opportunities with the mobile technology in Kenya. ICT is still growing

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slowly but with mobile technology it is driven to higher levels and thus many innovations that come with it. Finally i would say there is still room for further research on the mobile sector with regards with analyzing the policies especially targeting the telecommunications regulator (CCK) and the mobile sector. Due to time constraints not all would be covered and this would require a study over a long period of time.

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Part VI.

Appendix

Appendix A.

Interview Guide

A.1. Request letter for interview

Sylvia Nasambu Wasike

P.o Box 13657-00100

Nairobi, Kenya.

wasike@stud.ntnu.no

Dear Sir/Madam

RE: RESEARCH INTERVIEW

I am a Master of Science in Information Systems student at Norwegian University of Science & Technology (NTNU) specialising in Organisation and ICT use supervised by Prof. Eric Monteiro. Currently I am in the process of writing my thesis and my research project is about analysing policy implementation in mobile industry in Kenya.

Your background and experience in ensuring that the particular policies are implemented will be invaluable to me in my academic and career endeavour. I would like to kindly request your assistance by allowing me to schedule a 40–45 minute informational meeting with you. The purpose of the interview is to gather information that will better assist me in my research work and I assure you that the data collected will be held in confidentiality and in anonymity to be used only for the purpose of my research.

Looking forward to meeting with you.

Yours Sincerely,

Sylvia Wasike

A.2. Interview Questions

PART I (BACKGROUND AND SKILLS) Regulatory

i) What are your roles and responsibilities in the organization (Describe the roles and duties held before as well)?

ii) How many years of experience do you have in handling policies?

iii) As the regulatory department please give a brief overview of how the department is run and what is the scope of the work handled?

iv) Which other individuals do you work closely with when dealing with the implementation of the policies and what are their roles?

PART II (POLICY IMPLEMENTATION)

v) Please describe the process of policy implementation in your organization and who are the involved stakeholders?

vi) What is your (Organization) take on the implementation (Straight forward or Exhaustive) process?

vii) Do you have any specific strategies, prioritizing models and any trade offs considered in incorporating any specific policies or dismissing them?

viii) Do you encounter issues while enforcing tariff regulation policies in place? If so how do you handle such complexities if any that come with it?

ix) What is your view on effective competition and tariff regulation policy? With CCK being the telecommunication regulator do you think these policies are adhered to as should?

Appendix A. Interview Guide

(Question interrelated with the next one)

x) What policies do you think could be improved and for what reasons?

PART III (MOBILE PAYMENT)

xi) How did the mobile payment service all begin?

xii) Who are the concerned parties in this service and what roles do they play?

xiii) Consumer protection policy is considered very crucial in any organization dealing with e-money service how do you (Organization) enforce it?

xiv) Do your customers give or raise security concerns (risk of fraud, privacy and loss of service) how do you ensure that this is addressed and what measures have you put in place?

xv) What strategies have worked for you in the high uptake of this service in Kenya?

xvi) What facets of the mobile payment policies in place would you prefer changed or improved to ensure all interested parties are safeguarded?

xvii) CCK as the telecommunications regulator what role does it play in the Mobile payment service?

Appendix B.

Interview Transcriptions Full Text

B.1. Response from Airtel (18th Mar 2011)

PART I (BACKGROUND AND SKILLS)

i) What are your roles and responsibilities in the organization (Describe the roles and duties held before as well)?

- I have been the head of regulatory affairs in the organization i was before i moved to Airtel in 2010 holding the same position. My roles entail overseeing policy implementation following the guideline given by the CCK regarding issues such as Interconnect policies, Licensing, Issuance of frequency spectrum e.t.c. I also give a positional paper for consultative purposes then hand it over to the stakeholders for discussion, once bought in and it goes through the issues raised have to be implemented. I also participate in the ITU meetings and the ITU's Study groups.

ii) How many years of experience do you have in handling policies?

- 10 years overseeing the implementation of policies.

iii) As the regulatory department please give a brief overview of how the department is run and what is the scope of the work handled?

Appendix B. Interview Transcriptions Full Text

- The department is run in a top down manner whereby at the top is the director that the legal and regulatory chief reports to then roles and responsibilities are trickled down to the regulatory managers and at the bottom is the regulatory officers. As the regulatory department the whole implementation of policies are overseen here.

iv) Which other individuals do you work closely with when dealing with the implementation of the policies and what are their roles?

- Ministry of Information and Communication, CCK, Ministry of Finance and the International bodies ITU and GSMA.

PART II (POLICY IMPLEMENTATION)

v) Please describe the process of policy implementation in your organization and who are the involved stakeholders?

- Once the reference document(guideline) from the CCK gotten out of consultative participation with other stakeholders in the mobile industry is received we implement it and it is broken down to different departments dependent on the policies affecting them.

vi) What is your (Organization) take on the implementation (Straight forward or Exhaustive) process?

- Straight forward

vii) Do you have any specific strategies, prioritizing models and any trade offs considered in incorporating any specific policies or dismissing them?

- It is dependent on the impact on the business, there is no specific strategy in place but each policy has different strategies employed to tackle the issue that come with them. There is no leeway of dismissing policies once they have been approved.

viii) Do you encounter issues while enforcing tariff regulation policies in place? If so how do you handle such complexities if any that come with it?

- CCK tables the policies which in one way or another have to be agreed upon after the tariffs are set .Even though not favorable we have to implement while at the same time trying to explore avenues of changing through an appeal to the CCK. If appeal is seen viable it is considered and tariff are reviewed accordingly with agreement from the other players as well. The process might even take 1 year thus long.

ix) What is your view on effective competition and tariff regulation policy? With CCK being the telecommunication regulator do you think these policies are adhered to as should?

(Question interrelated with the next one)

- Important for fair play and for obligation purposes to avoid being dominant to the small players in the market. The policies are adhered to otherwise there are huge penalties for not.

x) What policies do you think could be improved and for what reasons?

- Tariff regulation it is too stringent and does not allow the operators to be creative and innovative with their products and services offered. The bars have been raised that it is so hard to regulate the market effectively. It is also killing the spirit of healthy competition.

PART III (MOBILE PAYMENT)

xi) How did the mobile payment service all begin?

- It was started as part of competition from Safaricom to be in the same competitive edge.

xii) Who are the concerned parties in this service and what roles do they play?

- Airtel money department who have to ensure growth in the use of service through: attracting customers, recruitment of the distribution channels(agents), system is up and running as it

Appendix B. Interview Transcriptions Full Text

should, offer assistance to customers with problems encountered with the service. Regulatory department ensuring that all policies are implemented to the end.

- Central Bank of Kenya (CBK)-ensuring that the financial obligations and money regulations are followed and also approval of license to operate any money services. Finally users of the service.

xiii) Consumer protection policy is considered very crucial in any organization dealing with e-money service how do you (Organization) enforce it?

- Consumer registration (Know Your Customer), System is safeguarded and whenever customers are transacting they have to show prove of ownership with their ID or Passport. Consumer protection regulation from CCK.

xiv) Do your customers give or raise security concerns (risk of fraud, privacy and loss of service) how do you ensure that this is addressed and what measures have you put in place?

- Adhere to the privacy and confidentiality clause as stipulated in the license if breached the organization is penalized.
- Department of revenue assurance & Risk who handle fraud cases reported by the customers. They also work closely with the police in investigating such cases. If fraud is due to employee negligence they are sacked. Loss of service is handled through compensation especially in cases that involve the systems fault.

xv) What strategies have worked for you in the high uptake of this service in Kenya?

- We have not had high uptake we have however had challenges due to our distribution channel which are mostly in the city centres

xvi) What facets of the mobile payment policies in place would you prefer changed or improved to ensure all interested parties are safeguarded?

- Not policy as such but would encourage network interoperability of payment platforms es-

pecially in the crediting and cashing in with the different network agents

xvii) CCK as the telecommunications regulator what role does it play in the Mobile payment service?

- The major player is Ministry of Finance through the CBK who have to approve the license to operate then the CCK issues the license.

B.2. Response from Orange Kenya (31st Mar 2011)

PART I (BACKGROUND AND SKILLS)

i) What are your roles and responsibilities in the organization (Describe the roles and duties held before as well)?

- As the regulatory officer my roles range from: Filing of tariffs and advising the organization on legal matters pertaining regulatory issues, lobbying for amendment of legislative policies, dealing with consumer protection, checking on the competitive environment and advise on whether the competitive measures
- Worked as an Intern in the legal department of CCK for 1 year .

ii) How many years of experience do you have in handling policies?

- 7 years

iii) As the legal/regulatory department please give a brief overview of how the department is run and what is the scope of the work handled?

- The department is divided into two main distinct sections that is legal and technical which is run by the head of regulatory affairs then below is the manager regulatory technical/Legal and at the bottom is the legal regulatory officer. The work handled here include: Compliance

Appendix B. Interview Transcriptions Full Text

issues, Frequency spectrum allocation, Licensing, Filling for tariffs and Submitting quarterly returns to CCK

iv) Please briefly explain which policies are directly handled in this department?

- National ICT policies

v) Which other individuals do you work closely with when dealing with the implementation of the policies and what are their roles?

- Marketing department dealing with business markets to issue instructions on products before it hit the market.
- IT & Networks handling the technical bits of frequency spectrum.
- Legal & Regulatory department handling disputes, drafting inter-connection agreement and handle customer complains.
- Customer service department and Finance Department handling financial issues
- Ministry of information and communication and CCK

PART II (POLICY IMPLEMENTATION)

vi) Please describe the process of policy implementation in your organization and who are the involved stakeholders?

- Mostly through licensing agreement set out by the CCK whereby the equity shareholding is 70% to 30% according to the CR12 draft following the laid down rules. • These process is handled by the regulatory department

vii) What is your (Organization) take on the implementation (Straight forward or Exhaustive) process?

Appendix B. Interview Transcriptions Full Text

- Straight forward

viii) Do you have any specific strategies, prioritizing models and any trade offs considered in incorporating any specific policies or dismissing them?

- None set out that are clearly outlined .CCK recently set out the universal service fund so the organization has been trying to access the fund but there is no clear structure to disburse the fund. We are supposed to contribute to the funds but without the structure we feel it is not clear and thus we have to pay otherwise we are fined.
- Trade offs incorporated is only when the applicants of certain service are invited for discussion for purely negotiations purposes.

ix) Do you encounter issues while enforcing tariff regulation policies in place and if so how do you handle such complexities if any that come with it?

- Not really CCK sets out the interconnection rates for terminating voice and data services then through that we set out the tariffs that would enable us break even with our services. The tariffs are mostly driven by the competition in the market after the interconnect rates have been set.

x) What is your view on effective competition and tariff regulation policy? With CCK being the telecommunication regulator do you think these policies are adhered to as should?

- CCK is not stern on this regulation as the big players in the market do not necessarily adhere to the policy and thus the small players in the market are frustrated in trying to break even with all the investment put into the business.

xi) What policies do you think could be improved and for what reasons (is it they are too hard or not well documented or not well understood?)

- Tariff regulation is not flexible to allow manipulation. Another issue is not policy as such but covers telecommunication infrastructure issues apart from the main electronic ducts poli-

Appendix B. Interview Transcriptions Full Text

cies. It should cover cases of vandalism that affect service delivery. Expensive to put up new ducts..

PART III (MOBILE PAYMENT)

i) How did the mobile payment service all begin?

- This was through change in customer needs that pushed the organization to create a value added service for the customers to be on the competitive edge. The cost, time and security matters were also put into consideration with regards to the old means customers used to sending money to others especially upcountry. It was also part of competition in the market.

ii) Who are the concerned parties in this service and what roles do they play?

- Mobile providers- Offering the service, Subscribers -users of service, CCK- Dealing with licensing issues
- CBK- Approves the applications to be given to the regulator once approved for licensing.

iii) Consumer protection policy is considered very crucial in any organization dealing with e-money service how do you (Organization) enforce it?

- KYC (Know Your Customer) registration • Basic agents' operation standards being monitored through impromptu visits.
- Consumer protection regulation from CCK as stipulated in the license issued has to be implemented and documented with the Central Bank of Kenya

iv) Do your customers give or raise security concerns (risk of fraud, privacy and loss of service) how do you ensure that this is addressed and what measures have you put in place?

- Question viewed as similar to (V) so answers were similar

v) What strategies have worked for you in the high uptake of this service in Kenya?

- Availability of the service that is ease of use and access with agents through out the country, Partnership with banks to offer value added services and not forgetting customer education which has been enforced. Customers having accepted it as a means of transferring and sending money we continuously educate them on the new features and services.

vi) What facets of the mobile payment policies in place would you prefer changed or improved to ensure all interested parties are safeguarded?

- Agents being given exclusivity of service provision to operate with one single operator. The number of years can be made flexible so that the agents can be able to change to offer services from another operator.

vii) CCK as the telecommunications regulator what role does it play in the Mobile payment service?

- Involved with regulations and arbitrating in market disputes that would arise due to unfair practises, ensure the customer is protected. and also deal with price regulation tariff in conjunction with the CBK and the National Payment system.