**Bachelor's Thesis (UAS)**

**Degree Program in Information Technology**

**Specialization: Internet Technology**

**2013.**

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MOBILE TECHNOLOGY IN AFRICA:

The Emergence and Indispensability of
Mobile Phones

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## MOBILE TECHNOLOGY IN AFRICA: THE EMERGENCE AND INDISPENSABILITY OF MOBILE PHONES

One of the numerous innovations that has made tremendous impact on the global society today is the availability of mobile phones. Mobile phones have become 'must have' devices owing to their role in communication. The purpose of this thesis is to highlight the importance and impact mobile technology has had over the years in Africa. In the early 80s, Africa was seen and regarded as a continent blessed with diverse resources, people, tribes and more but needed something different to keep her in touch with the rest of the world in terms of technology. This thesis will focus on mobile telephony use, the economic and social impact in Africa and some of the opportunities and challenges of this technology.

In this research work, further discussions will be made in detail including the routes which led to the proliferation of mobile devices, level of growth over the years, how African people have embraced this great technological innovation and conclusively, ways by which we can further improve on them to better the lives of all. The singular reason special interest was taken in this area of research was to fully comprehend how African people have fared since the invention of mobile phones and to an extent, and the Internet which provides a platform upon which these devices are used. Furthermore, this thesis also ascertains the trends regarding the ways these devices are used by different African countries and provides a wider knowledge of how the various telecommunication companies have helped in making their use a worthwhile experience.

KEYWORDS: Africa, mobile technology, mobile phones, telecom companies.

**FOREWORD**

I would like to express my profound gratitude to the Almighty God who made it possible for the completion of this work. Without Him, this would have been an effort in futility.

Also, I would like to thank my family, especially my mum and sister Cynthia Eyong for supporting me throughout these years and for affording me the opportunity of developing myself fully. Even though they did not directly influence the thesis itself, but they did provide me with utmost love, advice and support both morally, academically and financially not only during these years, but throughout my life.

A special thanks to my Degree Program Manager, Mr. Patric Granholm who also happens to be my supervisor. He oversaw the day-to-day supervision of this work and ensured everything took the right direction. Not leaving out Mrs. Poppy Skarli for her immense contribution all through my studies. Furthermore, I would like to use this medium to thank my lecturers at the ICT building, my friends, especially my best friend, Mr. Christopher Okorienta and Pastor Godwin Nnachi for their help and unflinching support.

**TABLE OF CONTENTS**

## LIST OF FIGURES AND TABLES

### LIST OF FIGURES

### LIST OF TABLES

# ACRONYMS, ABBREVIATIONS AND SYMBOLS

**Telecom(s)**    Telecommunication(s)

**GSMA**    Global System Mobile Association

**Apps**    Application(s)

**ISP**    Internet Service Provider

**IXP-Traffic**    Internet Exchange Point

**HIV/AIDS**    Human Immunodeficiency Virus/Acquired Immune
Deficiency Syndrome.

**SMS**    Short Message Service

**Kbps**    Kilobits per second

**ICT**    Information and Communication Technology.

**ATM**    Automated Teller Machine

**M-PESA**    Mobile Money

**M-KESHO**    Mobile money for tomorrow

## 1 Introduction

### 1.1 Research Background and Objective

Even though there has been a colossal boom in mobile technology in Africa over the years especially with mobile phones, one would say it is not yet a foregone conclusion regarding the overall use and how far this technology has traveled. It is generally accepted that "Behind every glory lies a story". This is so true with the birth of mobile technology because prior to the beautiful portable devices we use today, there was a great deal of work done. Many years ago, people were faced with problems of food, transportation, health and more, but bothered little about technological advancements and innovations that would change their lives for the better and make things much easier. Today, people have come to realize the importance of mobile phones in many respects.

Mobile technology is any portable technology which includes laptops and notebook computers, mobile and smart phones, Global Positioning Systems (GPS), palmtop computers, personal digital assistants and so on. There is a conventional saying in Africa that "When a man goes out and sees something good, he should bring it home and help his kinsmen". This has literally worked to a large extent in enabling majority of the African societies take cognizance of the importance of mobile phones.

It is worthy of note that, Africa did crave to have some of the best technologies found in the western world and did not know how to bring such to their doorsteps. In this light, the objectives of this research will be to:

➢ Examine some rigorous paths which led to the emergence of mobile phones in Africa.

➢ Evaluate the situations in various African countries

➢ Analyze their importance on the African continent.

➢ Examine the social impacts on families and society at large.

➢ See where mobile technology was some 15 years ago, where it is now and make projections for the future.

➢ Evaluate growth and what has been put in place to sustain it.

While we have been experiencing a huge increase in this sector in the Western world since the 1980s, the developing world is however, growing very rapidly too. In 2009, there were about 4.6 billion mobile phone subscribers in the world of which a massive 3.2 billion of those were registered in the developing world (Castells, et al., 2007; International Telecommunication Union, 2009). The reason why particular focus is made in Africa is not just to explicate the ICT penetration level vis-à-vis the advanced world, but to highlight the significance and growth these devices have registered in the global market as well.

## 1.2    Research Methodology

To elucidate the current trend in mobile technology with regards to mobile phones. Also, to highlight where and how Africa came to embrace this technology. Particular focus is made on mobile phones given their relevance in ICT on the entire continent. Risks and /or effects of their use, certain behavioral exhibitions by people and lots more.

The literature research was conducted in English. Materials and information were derived from secondary sources and correlations made. Materials were obtained from sources such as the internet, MTN local stores in Nigeria and Cameroon and online books/ articles. Inquiries and interviews were also made and conducted with ICT experts, personal findings in Nigeria and Cameroon.
Results will be thoroughly and qualitatively analyzed, as deductions will be made as well.

## 2.     History of Mobile Technology

Some years ago, many Information Technology engineers found it a 'tall dream' to actualize their dreams of transforming Africa technologically. This was so because many resources were limited, there was a wave of disbelief and priority attention was not given to technology as it was. Careers in development seemed somewhat distant and discouraging. In spite of the fact that cellular phones were in use as early as 1947 in the developed world, Africa was still lagging behind in that area. Mobile phones had existed in Africa but they cost something like 3,995 dollars which made it difficult for people to afford and carry about. Interestingly, the first cellular call was made in Zaire in 1987. During the Mobutu era in Zaire, the cellular phones weighed almost like bricks and people could not rent them because one needed a car in order to do so. That was so owing to the premature state technology was at the time.

The phone operator then was Telecel while the first commercial text message was sent in December 1992. Telecel had difficulties operating given the instabilities in Kinshasa. However, today, the number of text messages sent and received has exceeded 1 billion. In the 90s, people became curious to know the device that would connect them together regardless of distance. Hence, the emergence of mobile phones started. In 1999, a staggering 10% had mobile phones access predominantly in the northern parts of Africa such as Egypt, Morocco, Algeria and also in South Africa (GSMA data 2009). By 2002, there were 49 million cell phones in Africa while in 2008, over 60 percent of Africa's population could get a signal (About 93 percent coverage in North Africa and 60 percent in sub-Saharan Africa) which means approximately 11.2 million square kilometers had mobile phone coverage- equivalent to the United States and Argentina combined.

Owing to growth in this sector, there were disparities in coverage geographically which led to a debate over Intra-African digital divide (ITU, 2008). The largest mobile phone markets

in Africa are Nigeria, South Africa, Kenya and Ghana. Mobile industries include MTN, ORANGE, AIRTEL, VODAFONE, MILLICOM, SAFARICOM, VODACOM, GLO and so on.

## 2.1 Initiative and Motivating Factors

Africa has always had a penchant for the best and to compete favorably well with the rest of the world in terms of technology. That was the more reason why different attempts were made to improve the already existing telecommunication situation. After the advent of the first bulky mobile phones in the eighties, landlines were introduced which enabled people and families alike to make and receive calls from homes. That however, did not solve the ever increasing problems because people wanted to be able to communicate freely with every part of the world. It is true that some advanced countries concentrated and invested more on landlines, but Africa needed something different. Today, mobile phones have successfully leapfrogged the landlines. One notable point to make here is that landlines usually require wires installed on every roads and communities with smaller lines into every household. Moreover, installing such is quite exorbitant given the infrastructural problems such as good road networks and high population densities in every country. Due to the overwhelming and burning desire to stay on par with the Western world, relentless efforts were made in order to improve Africa's mediocre mobile technological industries.

## 2.2     Humble Beginnings

It is globally believed that the "the journey of thousand miles begins with a step". This is reminiscent of the pathway that led to what most people in Africa enjoy today in terms of the use of mobile phones. Most people who could afford mobile phones were regarded as 'Kings' or simply put, 'The haves' in the African societies. Families and communities had to converge at certain places to make and receive calls with only one or limited phone(s) because most could barely feed let alone afford them.

Furthermore, given the stereotype that mobile phones generated in the early 90s, many a people did not even know how to operate them. A typical story was told of a woman who accidentally picked up a cellular phone by the roadside in 2000. Just because she could not operate the phone, she had to call people to help her check if it was functional or not. To make matters worse, the people she had run to for help were unable to operate the phone, either. They had to give the phone to a rich man who coincidentally had a similar type of phone. That was certainly how appalling the situation was. Today, people do not only know how to operate them, but can do much more as it is with technological advancement. Mobile phones are important in risk reduction, as a way of empowering people, promoting investments, improving the efficiency of markets and more.

## 2.3    Mobile Technology and People's Perception

It is fascinating to know that there are about 650 million handset owners on the continent and according to the GSMA report, (GSMA, 2011). Africa currently has the second biggest market for mobiles in the world. Africa has gone beyond having a craving for mobile technology just for the fun of it to being innovative in terms of mobile technology application development, as well as proffering solutions to problems such as job creations, access to information and transfer of money which has become too prevalent today. Moreover, the introduction of smart phones has further widened people's scope of reasoning and

perceptions. People no longer want to be associated with the feature phones (low-end devices) and as a result, they try to save money for the multi-functional phones such as the smartphones.

Nowadays, mobile banking has been introduced in virtually all the countries on the continent. This, in a way helps in solving the unnecessary rush that people experience in African banks. People have become mobile-conscious so much so that they compete with one another on who gets the best phones. In Kenya, for example, a mobile banking system was introduced in 2007 known as 'M-PESA' which if translated means 'MOBILE MONEY' (M for Mobile and PESA for Money in Swahili). This system enables people to do their own banking and transfer of money.

In addition to that, the number of mobile subscribers has increased drastically. For example, the first quarter of 2012 has seen about 700 million subscribers (gsms.com) which is indicative of the fact that almost everyone wants to be connected unlike those days when people were too shy and scared to handle phones because they did not know how to operate them.

## 2.4    Groundwork for Expansion

The African market has garnered an unprecedented increase over the years given the influx of mobile gadgets in and around the continent. Several pieces of machinery have been set in motion to counter the recurring problems which the African people had faced before thus, the need for every African country to embrace the advent of mobile technology and to ensure its continuity. Africans buy mobile phones at a world record rate with take-ups soaring by 550%, in five years (Digital Advances, capacity4dev.eu). Mobile subscriptions rose from 54 million to 350 million between 2003 and 2008 which represented the quickest growth in the world (Unctad, 2009). As a matter of fact, Africa has the second largest mobile market in the world just behind Asia. There are approximately 48 mobile

subscriptions for every 100 people. Some countries like Gabon, Nigeria, Egypt, Kenya and South Africa now boast a reasonable percentage of penetration. It is expected that by the end of 2012, according a mobile telecommunication giant-MTN, that there will be 80 percent penetration in its 15 African markets (Guardian, 2009).

It is interesting to know that today, mobile technology is the largest platform in Africa and can access a wide range of income groups. It is also estimated by AppAfrica that mobile App downloads will reach 98 billion which will in turn be beneficial to mobile App developers in Africa. The main idea is to ensure smaller African countries get more penetration before the end of 2012.

## 2.5      Comparison with Western Counterparts

With regards to mobile technology, Africa has made giant strides in relation to other western continents with particular interest in Europe in terms of mobile connections. It is arguably true that Africa is still far behind with regards to technology, measurable parameters such as ISP subscriptions, number of hosts, IXP-Traffic, bandwidth and all-round infrastructural development, but is certainly making waves in the mobile industry. It was reported during the fourth quarter of 2010 that the mobile connections in Africa overtook Western Europe (Cn-114, 2011). However true and welcoming that is in mobile connections, Africa still has a long way to go in the area of mobile penetration divide according to digitaltrend.com.

Figure 2.5.1. Mobile Penetration Divide
Sources: (http://www.itu.int, webapp.my/the-mobile-penetration-divide-infographic)

In the diagram, for every 10 people, there are only 4 mobile phones available in Africa. For every 10 persons, there are about 13 mobile phones available for them in Europe.

- ➢ Europe: 12.5 phones for every 10 people
- ➢ CIS: 12.5 phones for every 10 people
- ➢ Americas: 9 phones for every 10 people
- ➢ Arab States: 7.7 phones for every 10 people
- ➢ Asia and Pacific: 6.7 phones for every 10 people.

The aforementioned statistics elucidate with clarity, the marked difference between Africa and the rest of the world especially the western world.

## 3 Mobile Phones - Advent and Invention

### 3.1 Rural versus Urban Users

If we are to go by assumption, we can categorically say that those who have mobile phone subscriptions also own mobile phones. This, in a sense is not the case with all. The manner in which people use and subscribe to lines in the rural areas is different from subscribers in the urban areas. As a matter of fact, most people in the rural areas prefer to use 'pre-paid subscriptions', the 'pay-as-you-go' system. This is comprehensible in a way because most rural area settlers depend on little and irregular incomes which would not afford them the luxury of having monthly mobile subscription fees or bank accounts.

Inasmuch as everyone would agree with the United Nation's vision which estimates about 50% mobile phone access by 2015, some experts have concluded that the importance of the "Digital divide" is between those with access to mobile phones and those without them (Economists 2011). For example, in Tanzania, it is believed that about 39 million have access to mobile phones but this is somewhat misleading as most people in the rural areas have little or no access to network. Apparently, 39 million Tanzanians are under the footprint of a mobile network according to Vodafone (2005), but there is only about 2.5% penetration rate which invariably means that 2.5% of the population owns a mobile phone. There is a great disparity in mobile phone usage in the rural and urban areas in Africa.

In the western world, mobile phone users are the ones who own mobile phones, but in the African society, the reverse is the case. Penetration rate information is usually projected based on mobile phone usage. Most people in the rural areas are involved in 'phone sharing' since not everyone can afford to use one. Families sometimes use one phone for communication. In Botswana, for instance, about 1 million people share their phones with families, friends and neighbors. This procedure is heavily being implemented in most rural areas in Africa as many people live in poverty. On the other hand, people in the urban areas benefit a whole lot owing to their financial capabilities and access to information. During festive periods, people in the urban areas buy phones for their loved ones in the villages in order to ease communication difficulties.

A new initiative was introduced in some rural parts of Africa where internet access was difficult and with very little electricity. Most people who cannot afford the smartphones are still benefitting from this initiative set up by ForgetMeNot Africa owned by Lon-Zim and ForgetMeNot Software. In 2009, this organization developed a 'MESSAGE OPTIMIZER' which would allow people to send and receive messages, check their Facebook accounts, twitter, yahoo messenger accounts at no extra costs. The simple way to do this is that subscribers send short messages using a code to their mobile companies which in turn forward the messages to the ForgetMeNot Africa's Internet servers. The servers do the processing, route, and ultimately send the messages back to subscribers who will now

respond to them. This system has worked quite well in most rural areas of Africa and even the cheapest of mobile phones can perform some functions meant for smartphones.

## 3.2. General Accessibility

Over the years, Africa has experienced an unprecedented growth in the mobile phone sector. It could be said that more Africans have access to mobile phones than portable drinking water. Little wonder the Rwandan president, Paul Kagame said in 2008 that "In ten short years, what was once an object of luxury and privilege, the mobile phone, has become a basic necessity in Africa" (gsma.com).

This goes to elucidate the rate at which people have embraced this technology. About 60% of Africa's adult population has access to mobile phones across 17 countries (Gallup survey 2011). South Africa registers the highest percentage in the following survey below:

**Table 3.2.1.   Mobile Phone access in Percentage (Gallup survey 2011)**

South Africa…………………………………………84%

Nigeria……………………………………………..71%

Botswana………………………………………….62%

Ghana………………………………………….59%

Kenya…………………………………………...56%

Uganda…………………………………………....52%

Senegal……………………………………………46%

Zimbabwe…………………………………………44%

Cameroon…………………………………………43%

Sierra Leone……………………………………………….37%

Tanzania……………….........................................35%

Chad…………………………………………………...32%

Liberia………………………………………….....22%

Mali…………………………………………….......21%

Burkina Faso………………………………………….19%

Niger……………………………………………….....18%

Central African Republic……………………………....16%

   It should be noted that men are the most likely to own mobile phones than women in those countries above. Approximately 60% for men and 50% for women and this also accounts for the fact that adults of ages between 20 and 50 have more access to phones. Access to mobile phones differs from country to country. Those who are educated, have well-paying jobs and live in urban cities are most likely to have mobile phones. However, the reverse is the case for some others according to the survey conducted in those 17 aforementioned countries (Gallup survey 2011), for example, Nigeria (urban 78%, rural 65%), South Africa (urban 84%, rural 88%), and Ghana (urban 59%, rural 60%). It is sometimes confusing and misleading to many when we talk about mobile phones and subscriptions. Most people in Africa use pre-paid SIM cards and more often than not, statistics are centered on subscriptions alone. For example, an individual can have a subscription without a mobile phone; many mobile phones and multiple subscriptions or a subscription without airtime/minutes. In Nigeria for example, some people in both urban and rural areas have subscribed to many phone companies but do not have mobile phones of their own. What they usually do is to borrow phones and insert their SIM cards depending on the lines they want to call.

## 3.3. Affordability

The United Nations has made plans to ensure Africans who live below $2 a day to have access to their own mobile phones. This initiative has helped in many ways. Cheap mobile phones have drastically changed the lives of many Africans especially in the rural areas. Farmers now use phones to access market prices, place orders and have also helped people search for available jobs. A grain farmer in Magaria, Niger Republic once said "With a cell phone, in record time, I have all sorts of information from markets near and far..." Inasmuch as there is the availability of 'cheap' mobile phones, there are still some people who cannot fend for themselves let alone afford them. Hence, the term 'phone borrowing' comes into play. Most people who have mobile phones sometimes make money from this system. These poor people borrow phones from their owners, make calls and subsequently pay them for such services. In Madagascar, people use the "cloud phone" technology to sign up, receive their own pin numbers and have the capability of purchasing airtime. This way, they can log in with their numbers from any handset.

Furthermore, it is forecast that by 2015, sub-Saharan Africa will have more people with mobile phone access than with access to electricity at home (catholic.org). Statistics in many African countries have shown that there are more mobile internet users than there are for computers. In Kenya, over 88% of people who access the internet do that from their phones.

In a nutshell, in spite of the fact that there are cheap mobile phones in the African markets, not everyone has the ability to afford them as there are many still struggling to eat three square meals a day, let alone the ownership of mobile phones.

## 4  Impact on the African Society

### 4.1     Social and Domestic Impacts

In a society where one is surrounded by family members and extended families, getting in touch with one another is considered as vital as food is to human beings. Africa has always been a continent where unity is embraced and affection for everyone reigns supreme. Some time ago, people used to sacrifice an awful lot on transportation in order to see their loved ones. However, with the emergence of mobile phones, the situation has become a lot easier. Hence, there has been an improvement on the social lives of the African people. In Tanzania and South Africa, 85% and 75% of people respectively said their relationships with their families and friends have improved tremendously as a result of the availability of mobile phones (Vodafone, 2005). Princewill, a final year high school student in Cameroon, said at 18.00 every day, he and his family would gather at home to receive calls from his siblings abroad. This brought unity amongst his family members as everyone would talk on the phone and demand for money and gifts. He also said his mum always went out with her phone in case she might want to pass information to them about house chores. This has helped create a strong bond of love and concern between families.  Even an old woman in the remote areas knows she has to rush home and answer calls from her children whether she borrows the phone from her neighbors or not.

Furthermore, it is not out of place to insinuate that mobile technology has revolutionized the perception of Africans. As the demand for mobile phones in the urban areas becomes increasingly higher, suppliers are gradually turning to the rural areas as everybody wants to be acquainted with new technology in vogue. Gone are the days when people were involved in letter-writing. Today, almost every nook and cranny of Africa is aware of the importance of mobile technology and this is something which never existed some decades ago. This technology has really changed the modus vivendi (mode of living) of Africans.

Those with low income budgets sometimes demand "scratch cards" from their friends and relatives. This enables them to reload airtime on their phones for calls. As mentioned before, most Africans use the pre-paid subscriptions or pay-as-you-go system. These scratch cards, once reloaded, start reading from the first call. This way, even the least amount on the phone can make calls. Those who have little or no airtime left engage in what is known as 'call beep or call back' which gives a signal to the person intended to call back. The essence of this is to ensure messages are conveyed without having to spend credit units. Glaringly, one important social impact mobile phones have had on Africans is that of an enhanced sense of well-being. People now think they can reach others where ever they are unlike before when letters had to be sent by post. We also have the issue of business dynamism, time and financial management and also reduction of costs of traveling in families. For example, in Cameroon, people could make international calls for as low as 25 cents (150 Fcfa) and local calls for 10 cents per minute (65 Fcfa). Those days, people used to spend as much as 10 euros to post letters abroad. Moreover, this has created job opportunities for many people. With an increase in the number of home-grown mobile operators, there has also been an increase in the demand for labor hence, employment opportunities for all. For example, the communications sector in Kenya rose by 130% between 2003 and 2007 (CCK, 2008).

## 4.2.    Benefits of Mobile Phones and Effects on People

Without any shadow of doubt, the proliferation of mobile phones in Africa has had a tremendous effect on the people, be it positive or negative. Some benefits are in education to expand children's knowledge, the creation of jobs for people, market improvement, costs reduction, business efficiency and availability of information to enhance engagement in social networks. One major benefit is what is known as "Mobile banking". Setting up bank accounts on the mobile is a no-brainer. What people do is register with a mobile operator and deposit some money into their accounts upon declaration of their ID cards and phones.

Owing to the fact that those who live in the remote/rural areas most times do not have access to banks, this system has helped tremendously as they can do their transactions on their mobiles. This system has created a huge convenience for people. People essentially use the phone to pay bills, move cash and more.

According to the manager for growth markets at I.B.M in 2011, "Africans are beginning to do things that even the developed world is trying to incorporate". He said in the developed world, managers would prefer to send their secretaries to the banks rather than operate such on their mobile phones (Guardian 2011). In America, it is considered a luxury to use smart phones for check deposits unlike in some parts of Africa where almost every bank transaction is done with the help of mobile phones. In East Africa, M-PESA, Vodafone and M-Kesho have all gone into collaboration with retail partners to offer banking services to people.
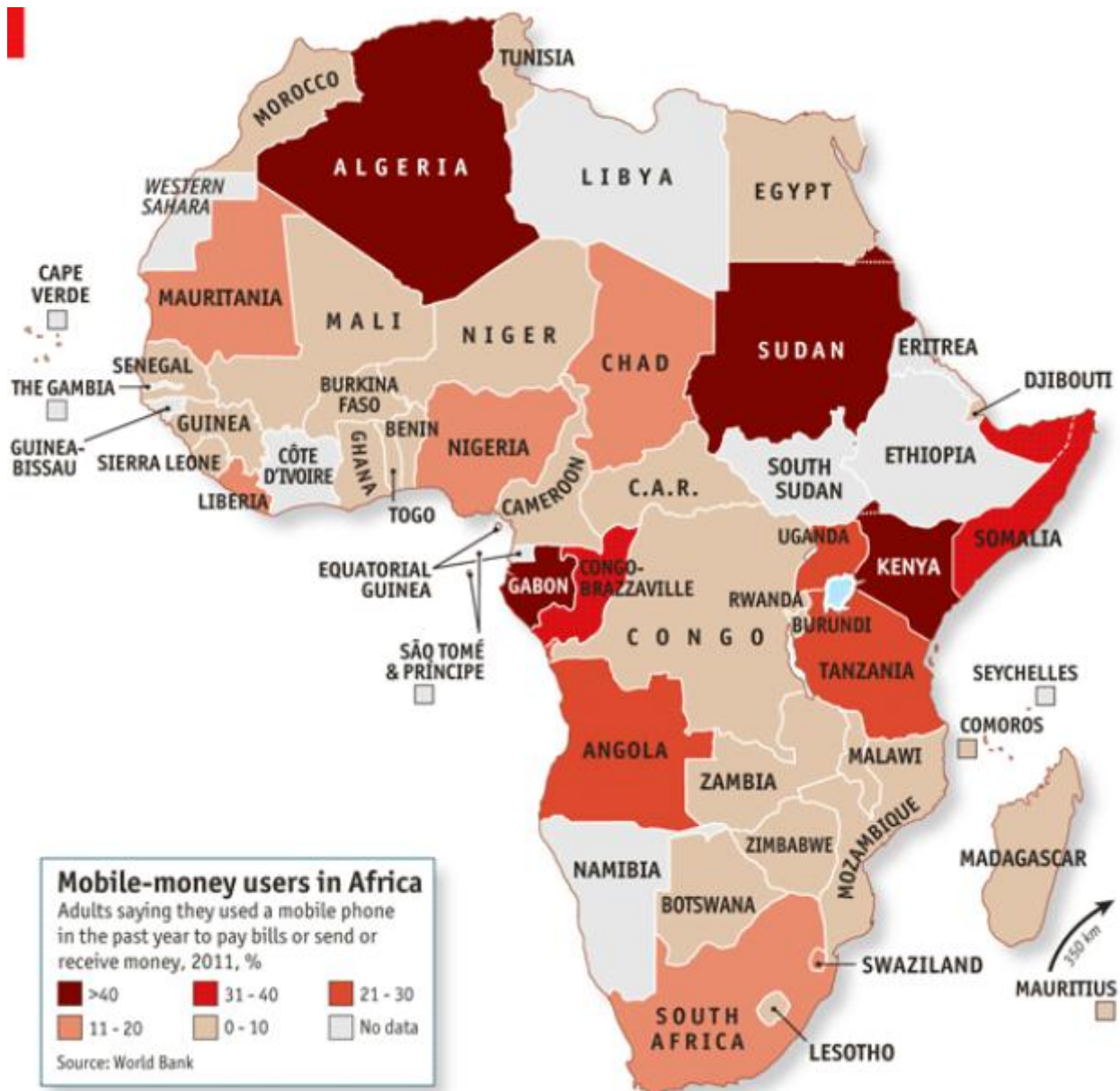
**Figure 4.2.2. Mobile-money users in Africa**:
Source worldbank.org

Although some central banks in Africa still stick to the old banking paradigm, worry about risks involved and know a little about the dynamics of mobile banking, some have

encouraged that in order to reduce transfer costs drastically. Ghana is an example of this. The Central bank of Ghana has authorized mobile operators to allow money transfer services and this has benefited millions of Ghanaians. Nigeria, on the other hand, is somewhat lukewarm on this. Mobile operators have been given the leverage by the Central Bank to sensitize the masses and kick-start the campaign of mobile money. Everything is still at a very slow state. The reasons for this might be that there might be e-fraud and clash on interests.

Furthermore, information search has come in handy. There is the introduction of 'Mobile agriculture' which has helped the way farmers think and approach issues related to their farm produce. Farmers can access market prices at home without having to go to the markets, negotiate deals/prices with suppliers and also improve the timing for their crops to the markets. Farmers send text messages to particular numbers and are furnished with various wholesale and retail prices. In 2009, Ghana launched a technology called the "ESOKO" where farmers could monitor market prices and place orders via their mobile phones and today, it has become very successful.

Again, an application called 'SANGONeT' meant for monitoring lactation history and period of cattle has also benefited small scale dairy farmers in East Africa. This necessitates the increase in farmers' sale prices of their animals.
Moreover, there is the importance of agricultural insurance products which small-scale farmers benefit from. Here, information is sent via their mobile phones. This is designed for farmers who cannot afford the usual insurance policies. In Swahili, we have what is known as 'kilimo salama', meaning 'Safe agriculture' which farmers use to insure their agricultural products against severe weather conditions such as rain and drought.

More to that, it would not be complete if the third and another important benefit is left out. This is 'Mobile health'. It is known that Africa suffers approximately 25% of global diseases with less than 5% health workers. Even though this technology has been on the slow side, it is forecast that in the next five years, it will have an increased operational efficiency and good care delivery. The use of mobile and wireless health services will be made available to health patients in electronic health data sharing, make them fully comprehend treatments

and subscriptions, costs reduction and also to reduce medical errors.  For instance, going by the rate of HIV/AIDS prevalence in Africa, this will serve as an avenue of managing the situation the best way possible. With SMS, people will be able to get notifications/test results and not wait for a month. This way, treatment can commence with immediacy. This tends to be very efficacious in South Africa where there is a high percentage of HIV carriers in Africa. A Non-Governmental Organization initiative, 'CELL-LIFE' has been set-up to combat this health issue in South Africa. To an extent, they have been doing well. Information regarding appointments is also circulated to pregnant mothers. This eases things and saves time too.

 On the flip side, mobile phones have had negative effects on Africans too, for instance, contraction of terminal ailments such as cancer due to the use of electromagnetic radiation. Hearing loss, emotional health and insomnia are also contributed to the use of mobile phones. The latter can be seen in Nigeria where free mid-night calls are being organized by MTN for all. Most youths have cultivated the habit of staying up all night because they want to make and receive calls for free. Secondly, most Africans are very impatient when it comes to driving and statistics have shown that most vehicular accidents are caused by careless use of mobile phones by drivers. People make and answer calls while driving recklessly too. Again, distraction from family members, peers and oneself is another negative effect. Africans are known for their huge attachments and care to/for their families but the prevalence of mobile phones has severed most family ties especially teenagers. Lies are concocted via the phone and more. They give little or no attention to what their parents say only because they want to chat, make calls and so on. All in all, mobile phones are just like the two sides of a coin which means they play different roles depending on how people use them.

## 4.3      Roles of Telecommunication Companies

Even though Africa has seen a remarkable growth in mobile technology, penetration levels still remain dismally low, a staggering 37%. The approach taken by operating companies threatens to truncate the growth in access to mobile phones. Many of the Telecom companies have been very slow in innovating new business ideas that will promulgate further growth. Some low-density areas tend to suffer from this. One-third of Africa's population is unable to get a mobile device and due to insufficient infrastructure, especially in the rural areas, it poses serious road blocks for mobile companies intending to expand their businesses. However today, Africa can boast of over twenty five mobile telecommunication companies. For instance, in the west and central parts of Africa, we have France's ORANGE presently in Cameroon, Mali, Senegal and Ivory Coast. Sudan's Sudatel, South Africa's MTN and Vodacom, Millicom in Senegal and DR Congo, Nigeria's MTN, Airtel and Globacom and more. In East and North Africa, we have Kenya's Safaricom and Airtel, Tanzania's Tigo and Zantel. Morocco's IAM, Tunisia's Tunisie Telecom and many more (orange-business.com, mtn.com, vodacom.co.za, millicom.com, gloworld.com, africa.airtel.com, safaricom.co.ke, tigo.co.tz, zantel.co.tz, iam.ma, tunisietelecom.tn).

There are some major pitfalls to the expansion and improvement required of Telecom companies. These can be the following:

(1). The importance of network expansion to less populated areas.
(2). How price-sensitive end users are.
(3). Mobile saturation in urban towns.

Those are so true because services in the rural areas tend to be fluctuating and poor. It may be shocking to know that some countries in their interiors have no communication links between Capital cities and remote areas. The telecom companies continue to under-perform in many countries apart from South Africa and most North African countries as a result of inefficient planning/management and unskilled labor. Since these operating companies focus on profit making, the regulatory incentives are lost completely. Too much

emphasis and focus is placed on the urban cities even though there tends to be a purported saturation of the markets. There is an alarming disparity in terms of service between the urban and rural areas and most Africans decry such. Telecom companies sometimes use underdevelopment as an excuse for their persistent failure to provide quality services. In most remote areas of Zimbabwe, neglect and poor developments have been used as political tools, and therefore, there tends to be little or no network service(s) there. In addition to that, the monopolistic nature of some operating companies has not helped matters either. Much of the poor network services experienced in many countries in Africa sometimes boil down to monopoly. For instance, MTN, Safaricom, Vodafone, Orange, Globacom and others being the leading telecom companies in Africa inflate costs even when their services are not up to standard. There is limited infrastructure for broadband services outside urban areas and due to the cost of 3G networks and this poses a huge problem for people to access.

However poor the services of these companies may be, we cannot overlook some advantages by the telecom companies in Africa. South Africa boasts of the continent's most advanced networks and services offered by mobile phone operating companies. There is stiff competition between MTN, Vodacom, Telkom SA and others resulting in room for improvement and quality of service. Quality of service is what mobile phone users expect of these companies. Their 3G mobile broadband offers great speed and affordability and looks forward to a new generation of mobile technology: the 4G.

## 5   Growth of Mobile Phones

 As seen in the introductory remarks, mobile technology in Africa is growing at a very fast pace. However, growth does not only differ from country to country, but also from sector to

sector. In fact, the introduction of high-growth products such as smart-phones has bolstered market growth quite significantly. Fascinatingly, Africa is said to be considered as the world's growing region in terms of cellular connections and the second largest world market in mobile phones. It may suffice to say that its growth has not only been down to the numerous operators, but importantly down to the social and economic impact it has had on the society. People want to improve on their lives and get sociable and this has worked a great deal. It is understood that in South Africa, people spend between 10-15% of their salaries on mobile phones, compared to 5% in the developed world. This is indicative of the fact that the poor in Africa find mobile phone acquisition and services so valuable (Coyle, 2004). Nigeria, Africa's most populous nation is on the forefront with about 103 million mobile phones subscription. South Africa has the highest broadband penetration level (7%) on the continent followed by morocco, (3%).

Growth in this sector has attracted investors and mobile companies alike to want to do business and take it to the next level. One would argue that the reason for the boom and unprecedented growth in the sector is that most land-line users have shifted to mobile phones because they consider the former very expensive and unreliable. It is anticipated that by 2015, subscribers should be around 900 million (valuewalk.com).

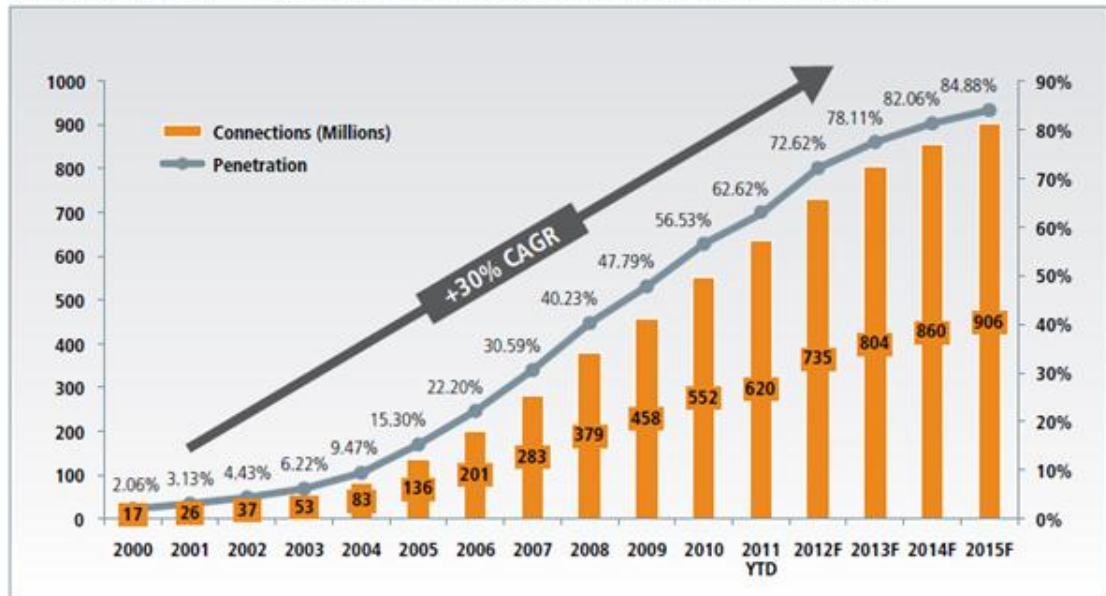Total African Mobile Connections and Penetration Rate (million, % penetration)[1]

**Figure 5.3.  African Mobile connections and Penetration Rate:**

Source: Africa Mobile Observatory 2011, (gsma.com)

## 5.1       Limitations and Factors Affecting Growth

It will be interesting to know if, given the pace at which the mobile phone sector is experiencing remarkable strides in Africa, there is any stopping that or there are some factors militating against growth. The answer is a big 'YES' because growth is not particularly seen in all African countries and cities, especially in the rural areas. Inasmuch as we commend Nigeria for making waves in the mobile phone markets, investors and mobile operators are unwilling to invest heavily in remote cities as a result of problems of infrastructure as already discussed above. For instance, in one remote village in IMO State of Nigeria last year, an MTN mast was vandalized by the local youths. Attempts were made to know why such an uncivilized act was perpetrated and they rather attributed it to poor network services from MTN (one of Nigeria's telecom giants) and also the epileptic power

supply in the country. They said MTN only bothered about mounting masts everywhere and not how their services were rendered. However, it was understood that MTN had requested for support from the local community and government for improvement but their pleas fell on deaf ears. Some people also lamented on the incessant power failures which made it hard for them to charge their mobile phones. Some had to go to neighbors who had generator sets to have their mobile phones charged. This has discouraged some people today from having phones as there might not be electricity to even charge them. In a nutshell, everything boils down to the problem of infrastructure and this singular factor has hampered growth to an extent not only in Nigeria, but in other parts of Africa. There is also the problem of imposition of high taxes and complexity in regulatory framework.

 Another worrying situation is the insufficiency of bandwidth or low-bandwidth and its costs. Given the growth of mobile phone users especially smartphone users in Africa, this poses a serious problem. In Tunisia for instance, the connection speed in Tunis is 2211 kilo bit per second (kbps) just behind that of Rabat, Morocco (3251 kbps). It is actually the second fastest connection in Africa but comparatively, it is only like one-seventh of South Korea's connection speed which stands at (14600 kbps), (Morocco Board).

 Furthermore, low level of literacy is a contributory factor. A good number of people in Africa still cannot operate mobile phones in spite of numerous publicity and seminars on this. This, in this context is called 'digital divide' (Disparity between groups/individuals as regards the use of or knowledge of Information and Communication Technologies, ICT). Uganda has a population of about 28 million but shockingly, about 9 million can neither read nor write. So, information becomes difficult to be understood and properly implemented by such people. Now, with the invention of smart-phones, how can illiterates operate them? This is exactly the situation in Uganda and some parts of Africa.

## 5.2      Current Trend, Projections and Future of Mobile Phones

With the introduction of smart-phones on the African markets, the situation has taken a new turn and people now have a sense of belonging and knowledge with the outside world. The cost of smart-phones is fast dropping and connections to global digital services have been enhanced. Again, data is fast becoming a major area of mobile usage in Africa. In Kenya, as said before, people get online via their mobile web rather than the PC web. This is indicative of the rapid progress recorded in mobile technology in relation to mobile phones. Third generation or 3G technology is growing in many African countries, especially in most francophone countries and also South Africa.

In South Africa, there exists competition between mobile operators as regards the price of bandwidth in what could be described as 'offer more data for less money'. This, in a sense, has spurred growth in the use of 3G for data purposes. Data usage average keeps increasing on daily basis and the number of smart phone users is obviously set to grow the more. Speculations have started making rounds about potential introduction of 4G technologies but that still needs to be seen. However laudable the prospects are, one problem is the over-subscription of mobile operators which has consequently led to traffic. In Summary, to really explicate the rate at which things have panned out today, the World Bank Data summarizes it thus "Out of one billion people in Africa, only an estimated 140 million use the Internet, but over 600 million use mobile phones" (World Bank Data, June 2012). That is how best the situation can be interpreted.

The number of subscribers is projected to reach 800 million by 2015 also leading to a rapid rise of about 60%. It is however, not expected that the manner of growth in the last ten years will be the same when the subscriber base rose from about 20 million to 500 million. In terms of mobile phone users, Nigeria has one of the biggest markets in the world. It is also expected that the east and central African countries will have very high growth rates.

Smartphone penetration in Africa today is very low but it is believed that in the nearest future, smartphones will be made completely affordable and readily available to all. In

Kenya, for example where the use of M-Pesa is common, there is every likelihood that mobile phones will replace ATMs and going by the success rate recorded so far, experts have made projections for the next ten years. Situations might arise where in Kenya, the prevalence of mobile phones will render banking halls very empty.

The future of mobile technology looks bright in Africa as the following areas which need improvements are being considered by IT experts:

(a) The consideration of mobile phones as an authoring platform rather than an access platform. Today in Africa, most people still see the latter as the only option and purpose for which phones were manufactured. However, in the nearest future, these devices would be seen as the computers of Africa when remedies for authoring contents will be fully designed.

(b) Language problems on keyboards and fonts. These are areas which will need urgent consideration as not everybody from any device can access contents in any language in the world. The lack of free fonts and character sets makes it difficult to achieve all these. Most people cannot access information in their own language(s).

(c) The development of voice-based web access (Multimodal interfaces). This is one area which will need improvement. The underprivileged in different communities will benefit immensely from this.

(d) Mobile web access will increase exponentially, making it easy for the African population to go online at will.

(e) Mobile applications will have a domineering effect on the African market.

### 5.3. Improvement

There is a certain wave of "we are almost there" in Africa at the moment. People believe in terms of mobile technology, and with regards to mobile phones, Africa will someday be the leader globally. In this light, there are also improvements that should be implemented first and foremost and some of which have been done. Since mobile phone tariffs are prohibitively expensive, mobile operators and governments have devised a means of curbing such problems by reducing taxes and also making cheap mobile phones available for all and sundry to purchase. More to that, the reduction of communication costs will further increase the speed of the flow of information with the network hence, help people respond favorably to shocks.

Furthermore, local people have found a way of getting around high costs which is quite common on the continent. This is the use of the usual predetermined messages like "Please call me back" or "I'm here". This, in a way, has improved the mobile phone market as people find it fun to do and so, the desire to have their own mobile phones. Candidly, this sort of practice is mostly seen among the 'Have nots' in the society. Those who cannot afford recharge cards or airtime use this method to reach out to their friends and relatives.

Different governments are putting everything in place to provide the infrastructures needed for sustainable growth in mobile technology. Albeit slow, it is a step in the right direction. The provision of infrastructures will enable telecom companies to render quality services to mobile phone subscribers. As soon as the right tools are put in place, people will find the use of mobile phones worthwhile and a lot easier. ICT literacy programs in schools and homes have been designed to sensitize people both in the rural and urban cities on the importance of this technology. This way, assimilation and interpretation of information will be enhanced.

**6. Case Studies on Mobile Banking, Penetration and General Use in:**

**6.1.    Uganda**

Uganda has a population of about 32 million and with an HIV prevalence of 5.4% among adults of ages between 15-49 years (World Bank, 2008a). It is ranked 156 out of 179 countries in the United Nations Development Index which is indicative of extremely low life expectancy, education, income and purchasing power (UNDP, 2008). It is interesting to know that of the 48% of Ugandans who have mobile phones, about 30% carry fake ones around. In spite of the fact that there has been the presence of the "fake or counterfeit" mobile phones, this has not stopped Uganda from connecting people via mobiles. People buy phones with dual SIM cards, with different mobile operators in order to call relatives and friends whenever better and quality services are available.

Comparatively, teledensity is still less impressive in relation to that of Kenya. Some Ugandans are as well involved in phone-sharing owing to the fact that only a third of the population can afford even the cheapest of 'flashlight' phones. MTN is predominantly the leading company with an estimated percentage of about 70, thereby monopolizing services across the country.

In terms of penetration levels, Uganda has one of the least in Africa even though the Government has completed the installation of fiber-optic cables in order to enable people connect via them. Uganda has about 14 million mobile users with Internet penetration at a meager 4.9 million (2.5% penetration). Symbian Operating System is the most commonly used.

In 2003, an initiative known as the 'Village Phone Uganda' was launched in collaboration with Grameen Foundation (A foundation that helps the poor, provides access to financial services and empowers people), MTN Uganda and some other micro-finance institutions.

This village phone initiative, otherwise known as the "Pay phone" was set up to serve the following purposes:

✓ For rural connectivity
✓ Support micro-finance as it is with other sub-Saharan countries
✓ To promote entrepreneurial skills and provide micro-loans to those who could not bank and so on.



**Figure 6.1.4. Village Phone Kit**
**(Grameen Foundation, 2009)**

The project was originally aimed at the rural and semi-rural areas outside Kampala. Today, in order to enable Village Phone Operators to start off business in earnest, they have to approach the micro-finance institutions, fill in the application forms and an insurance of loan

payment in the long run. Next, they will receive the Phone kits which include a handset, chargers, antennas, sign posts, SIM cards with prepaid airtime and business cards.

It should be noted that the Grameen Foundation acted in the following areas:

◆ Provision of customer service support
◆ Infrastructure needed for communication
◆ Airtime provision.

However, this is not to overlook the roles played by the Micro-Finance institutions in the project as well. The institutions assist in the identification of Village Phone Operators (VPOs), in technical support, provision of loans to MTN Village Phone Operators, training and development of business skills.

The initiative was to have about 5,000 mobile phone businesses in a period of five years but today, the Village Phone Program has established more than 6,500 businesses across the country. The initiative was inevitably directed at women, but is now aimed at men.
As of today, Grameen has begun leasing smart phones to local farmers to enable them receive information on seasonal weather situations, planting advice, market prices, disease diagnostics and facilitate access to family planning. The latter has been introduced to help curb the rate of unwanted pregnancies via the mobile phones. Now, text messages are sent to women and Interactive Voice Responses (IVR) arranged in order to ease the entire exercise. This initiative is in partnership with Program for Accessible Health Communication and Education (PACE). Mobile phones are becoming increasingly cheaper by the day and more service providers, being licensed across the country. The introduction of the 3G and potentially 4G technologies have also come in very handy making life a lot easier for all.

**Mobile Money in Uganda**

Mobile money can be defined as the use of money to make transfer of funds between accounts or banks, pay bills, withdraw or deposit funds. It could be seen in electronic commerce in a broader perspective as it could be used for the electronic or physical purchase of items. Usually, customers download an application, sign up for the service through an application provider, and register their bank account numbers. Instructions provided by the application provider are followed carefully and afterwards, an SMS is sent to destination accounts which could be numbers or addresses. Customers pay cash to retailers in exchange for loading virtual credits on their phones. This system has helped many Ugandans transfer money to their families and friends, especially the unbanked in the rural areas who have no access to banking facilities. There are no long journeys made to the banks, no long queues and so on. It is that simple. As of October 2012, MTN recorded about 2.5 million Ugandans on mobile money with a 3.5 million target by the end of the year.

However, one of down-sides or challenges of this practice in Uganda is with registration which requires genuine identification. This is because Uganda is still battling with the issue of national identity cards. This creates room for falsifications. Another problem is with the manner in which money is regulated. Sometimes these retailers run out of cash for the simple reason that a lot of money has been sent to the rural areas given the high demands there.

**Table.6.2. Channels used to send Domestic Remittances in 2011:**

**Source: (www.gallup.com, 2011)**

*Domestic Remittances Are Considerable Across Most Sub-Saharan Countries Surveyed*

Ranked by those who received domestic remittances
Population-weighted averages based on total adult population

| | Received domestic remittances | Received domestic remittances, excluding those who received money in person only | Received international remittances |
|---|---|---|---|
| Kenya | 59% | 46% | 4% |
| Botswana | 39% | 22% | 3% |
| Sierra Leone | 39% | 29% | 20% |
| Nigeria | 35% | 23% | 3% |
| Uganda | 35% | 21% | 4% |
| South Africa | 29% | 23% | 3% |
| Tanzania | 26% | 16% | 4% |
| Congo (Kinshasa) | 21% | 15% | 5% |
| Zambia | 16% | 9% | 2% |
| Mali | 13% | 11% | 8% |
| Rwanda | 10% | 8% | 2% |
| Total | 32% | 22% | 4% |

Based on surveys conducted in 11 sub-Saharan countries throughout 2011.

GALLUP'

In the table, it is vivid that almost half the Ugandan population is involved in mobile money transfer owing to its popularity and ease with which it is used. Life has been made fairly easy for people and it could not have come at a better time than now.

## 6.2    Nigeria

In the past decade, Nigeria has witnessed an unprecedented growth in the telecommunications industry particularly, in mobile technology. Her first GSM license was issued in 2001 and has over five active GSM operators (GLO, MTN, ZAIN, MTEL, AIRTEL, ETISALAT and so on). The first three operators account for over 85% of mobile subscriptions in the country. Like other parts of the continent, the pre-paid mobile service is seen as the most common. It is worthy of note that, the pre-paid subscriptions account for an average of 99% of total subscriptions.

MTN still remains the highest player/operator in terms of subscriptions. It has introduced a lot of value added services such as video cams, Mobile-TV, MTN Google, Mobile internet and more. GLO and ZAIN have made remarkable impacts in the Nigerian society. In 2009, ZAIN brought in an ultra-low-cost handset project which marketed mobile phones as low as $20. GLO, on the other hand, did introduce affordable scratch cards, that is, scratch cards of lower denominations so that everyone could afford one.

While the aforementioned two operators have made great progress in the mobile markets, ETISALAT has also made a huge innovation recently; the introduction of accessible package of mobile commerce across the country. This means customers can access a mobile commerce service via a user-interface installed directly on their SIM cards. This service is available in different dialects such as Igbo, Hausa, Yoruba, and also in English. Just like the introduction of mobile money in East Africa, ETISALAT uses another avenue

to help all its customers in order to foster financial transparency and to expand channels for monetary transactions. Customers are now able to pay their bills, receive and send money, make cash withdrawals, manage their bank accounts, have their airtime accounts topped up and so on.

Nigeria is a country that has a population of over 170 million and it is fascinating to note that there are about 103 million subscribers in the country making it Africa's largest mobile advertising market. It is correct that most subscribers sometimes may not own mobile phones as explicated in the previous chapters, but Nigeria commands a larger chunk with regards to mobile phones ownership and subscription. On the other hand, the penetration level remains relatively small. Nigeria has about 69% mobile phones penetration level with teledensity at 69.1%, a far cry from some countries like Senegal (79%), Ghana (84%), and Benin (85%), (GSMA 2012). Out of that percentage, about 28% has internet penetration which makes it one of the highest on the continent (Nigeria), while about 7% has broadband penetration with an average internet download speed of about 1.38 Mbps.

Smart-phone technology is growing quite rapidly too giving a 42% quarter-on-quarter growth in the country. Many consumers now use their mobile devices especially phones for online browsing and shopping thereby rendering the Cybercafés less busy. According to Independent Mobile Advertising Network (InMobi), a channel for social media has a likelihood of increasing more (60%), information (43%), emails (26%) and for entertainment (23%). Phone sharing is also practiced in some remote communities and network services are quite irregular.

The availability of mobile phones in the country has helped immensely in the management of situations like in education, health, entertainment, social media etc. In terms of social media, Nigeria is ranked the world's second country with the largest Facebook mobile penetration having about 87% users.

**Mobile Money in Nigeria**

It is of great interest to know that of the 170 million people that Nigeria has, only about 30% have bank accounts. This is a very disturbing scenario going by the appreciable progress recorded in many parts of Africa in terms of mobile money. As with some people in Uganda, most Nigerians do not have identity cards, a fact which further complicates the smooth transition of mobile money.

In 2011, the Central Bank of Nigeria did license about 16 banks and other financial institutions to start operations, but its progress has been somewhat slow given the fact that this process does raise a lot of skepticism among Nigerians. These institutions have been very sluggish to act ever since. Problems of insecurity, lack of finance, lack of basic infrastructure, awareness and credibility of operators are among the things on debate. Some see this as a system meant for people in the rural areas alone and therefore, are not interested in any transactions at all. Nigeria has about 3,000 mobile money agents across the country. Whatever the case, there is mobile money in Nigeria but its progress is nothing to write home about.

## 6.3 South Africa

South Africa is a country which has a population of over 50 million and Africa's strongest economy. As far back as the year 2000, a staggering 17% of adults could use mobile phones, but today, over 29 million people use mobile phones (Nielsen wire, 2011).

South Africa is ranked 5th in the world in terms of mobile phone usage. More than 11% use their phones to go online with adults being the most users (Nielsen wire, 2011). Again, about 90% of subscribers use Facebook while about 65% use the newly introduced instant messaging platform, MXIT (mediaclubsouthafrica.com, 2011).

Interestingly, South Africa remains one of the leading innovators in micro-blogging and social networking. Like it is a norm in most parts of Europe or the western world in general, text messaging is nationally preferred to calling. This is because many South Africans believe it is less expensive and also the fastest and easiest means of communication.
It is also note-worthy that Nokia (about 60%) still remains the leading mobile phone giant in the country albeit some people still use others such as BlackBerry, Samsung, Sony Ericsson and so on.

Just as subscriptions for mobile phones in South Africa are, the penetration level has increased dramatically to over a hundred. In a recent study carried out this year, there are about 9 million active Internet users trailing Nigeria's 28% and Egypt's 35% (internetworldstats.com, 2012). One would argue that owing to South Africa's status on the economic front, internet penetration should be as high as their counterparts in the world, but it is not the case. The lack of infrastructure and the high cost of broadband account for this. The introduction of smartphones has slightly tilted the penetration level to the positive side; about 17% (Google South Africa 2011).

South African adolescents and youths were the first to embrace mobile technology with about 70% of ages between 15 and 24 having mobile phones. This explains why most of these young people encounter the risks of cyber bullying, sexting, child abuse images and videos and so on.

The five biggest mobile phone companies in South Africa are Vodacom, MTN, Cell-C, Telkom, and Virgin Mobile. Most of these companies offer cheaper alternatives to access the Internet via mobile phones. Mobile Internet is favored over stationary Internet because

of its low cost. Mobile broadband packages cost something like $1 per month while ADSL stationary Internet costs about $7 per month.

**Mobile Banking in South Africa**

Just like the M-Pesa in East Africa, South Africa is involved in mobile banking. In fact, Vodacom did introduce the M-PESA version in 2010. However, it has not had the same success as in some East African countries like Kenya and Uganda. It is still on the slow side. The aim is to be able to reach the unbanked in the society as stipulated before. Different banking options are provided to both rural and urban dwellers. According to the World Wide Worx research report, two out of every ten South Africans use the mobile phone for financial transactions. About 25% use their phones for accessing their bank accounts and sending or receiving money (Wide Wide Worx Research Report, 2011).

## 6.4 Egypt

Telecom Egypt launched the first global system for mobiles (GSM) network in 1996. However, Egypt did undergo a revolutionary phase in 2011, on account of political unrests and this stalled technological innovation in some way. Even in the midst of all this, it never deterred the nation from making strides in mobile technology. Egypt is the third most populous country in Africa with a population of about 82.5 million. It is, however, of interest to know that Egypt has a market penetration level of more than 100 percent. One of the first countries in Africa to launch the 3G technology, it was awarded its third mobile license in 2006 and aiming for a fourth in 2013.

Subscriptions climbed to a massive 112% as at March 2012. Egypt has 31 million Internet users giving the Internet penetration a 29 % rate (masress.com, 2012). Egypt has three major mobile phone operators namely: Etisalat, Vodafone, and Mobinil. In terms of bandwidth, users and services offered, it is one of the most developed internet markets in Africa. Bandwidth has increased to 224 Kbps.

**Mobile Money in Egypt**

About mobile money, it is still an uphill task faced by the country and may be considered a 'wish' by all. This is because only about 10% of the country's population has a credit card which makes it very difficult at the moment to record some level of success. Furthermore, considering the political turmoil in the Egypt, mobile operators have declined to go ahead with the mobile money campaign. This is something which will only be made achievable in the foreseeable future considering the political instabilities in and around the country.

**Conclusion**

There is a popular West African proverb that "When a child cries and repeatedly points in a particular direction, it is indicative of the fact that either the mother or father is there". Africa has rightly pointed in the direction of revolution and innovation which has hugely paid off today. Just like many people in Africa used to ride their bicycles hundreds of kilometers only to convey simple messages, we have a better means of doing that now. There is no denying the fact that Africa has a lot of shortcomings in terms of ameliorating its economies and alleviating poverty, but like the African elders would say "Asking after others is much better than money". This, if literally explained means when one constantly asks after his/her family of their well-being, it does not only show signs of care and concern, but also puts smiles on their faces. This has been made achievable since the invention of mobile phones and their prevalence in Africa. Thus, people can now inquire of their friends' and families' well-being.

By this research, it is understood that mobile technology has transformed the way Africans think, behave and relate with one another. Moreover, mobile phones have created a certain wave of belief and love amongst families and friends which could not be seen before. This is certainly the essence of change.

In chapters one and two, the history and invention of mobile phones were discussed. This research did make it vivid how Africa strove in ensuring her people enjoyed some of the best technologies that were seen in the western world. In spite of the penurious states of some people, they still manage to state on top of things with regards to mobile technology.

Chapters three and four focused on impacts and growth. Without any doubt, mobile technology has been a breath of fresh air to the African people. Some years ago, people were too shy to ask questions about phone operations, but today, most people have understood the basics. Africa has one of the world's biggest mobile markets owing to the success made over the years. There is every degree of hope that in the next couple of years, Africa, in terms of mobile phone penetration could become the leader.

In addition to that, this research explicated the importance of mobile money which has been a success in many countries of Africa. Rightly so because the unbanked in the rural areas now believe they can send and make withdrawals without having to queue at banks, have bank accounts and travel long distances in order to do that. This, as explained is one of the success stories of this day's mobile money in Africa.

Furthermore, it highlighted the situations of different countries not only on the continent, but the world as well. It may suffice to say that Africa is not far off the pace in terms of mobile technology as it is perceived by some. This technology may have been slow in Africa, but it has paid off in many quarters and made life very easy.

**Future Research**

In the future, further research will be carried out to look into the different areas of mobile technology and how well different African countries would have coped in the era of modernization. Also, the introduction of potentially newer technologies, modalities implemented and more on the 4G technologies. Detailed statistical results and graphs on trends, broadband Internet access to not only cell phones, but also tablets will be derived. Moreover, further research will be made on several data encryption measures put in place and many more fascinating findings that would be of huge importance. Visits will be made to various mobile phone companies across Africa to further assess their levels of contribution to societal needs.

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