University of Nairobi

School of Computing and Informatics

Mobile Phone Technology Adoption in Rural Areas, the Affordability Factor in Adoption:

A Case Study of Kakamega East District.

By

Muhalia Allan

P56/70270/2007

Supervisor

Mr. Christopher Chepken

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Declaration

This research project describes the work undertaken as part of a programme of study at the University of Nairobi- School of Computing & Informatics. The research is my original work and has not been submitted for the award of a degree in any other university

Signature ---------- 15/10/2010

Muhalia Allan P56/70270/2007 **Date**

This work has been undertaken by the student under my supervision and the submission is hereby made to the University of Nairobi –School of Computing &Informatics with my approval as the student's supervisor

Signature ---------- 18/01/2010

Mr. Christopher Chepken **Date**

Dedication

This research project is dedicated to my Wife, Cate and lovely Children Yitzhak, Maura and Linda

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Muhalia Allan

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Abstract

Mobile phone technology has grown rapidly in developing countries and its impact at the macro economic level has been phenomenal. Kenya has not been left behind in this growth that has been witnessed world over literarily breaking economic barriers. The growth of the mobile phone in Kenya has been both in numbers of subscribers and geographical foot print and statistics from the sector regulator indicated that the subscriber numbers were in excess of 18.5 Million and geographical coverage at 84 %(CCK, 2009)

The key questions of the research were based on the affordability issues when it comes to mobile phone adoption and the question of a mobile technology adoption model that can address the needs of the low income earners. The study found out that the adoption of the mobile phone in the subject area was 80% and the users of mobile phones spent between 12-25% of their income on running of mobile phone against proposed internationals standards of 5% of income on communication services. 30% of the adopters of the mobile phone were dependent on third party sources for air time and this findings suggested that the rural poor may be adopting mobile phone but at a very high cost and there needs to be refocused policy shift that looks at universal service in the context of mobile phone as opposed to legacy fixed network. The adoption of mobile phone among the majority in the rural areas does not necessarily conform to well known models of adoption as in some cases adoption takes place before acceptance due to a large majority in rural areas being dependent upon the urban population in both acquisition and maintenance of mobile phones majorly for maintaining social networks and relations.

1 Chapter 1: Introduction.

The last ten years has seen an unprecedented growth of the mobile phone ownership and usage in the world and the same has been replicated in Kenya. The once priced gadget that was a preserve of the politicians and businessmen is now accessible and owned by the majority of Kenyans from the top to the bottom of the economic pyramid .The unprecedented growth has brought to fore a number of industry regulatory issues that need to be relooked at in the context of the rapid changing sector of ICT. One among the many issues that has to be revaluated is the role of universal access in the context of reach to the uneconomically viable areas when it comes to mobile cellular communication. Statistics point to a mobile phone subscription of 18.5 Million Kenyans and 84 % population coverage (CCK, 2009).

Universal access has been predominantly defined by three features i.e. Availability, Accessibility and Affordability (Intven&Tetrault, 2000). The focus of most universal access strategies has been in the area of accessibility and availability and this has historical reasons that are related to the fixed networks that gave birth to universal services paradigm .The fixed network was defined by the geographical presence and the number of fixed lines rolled out. This model was used to define universal access and gave birth to communal calling booths, telecentres and village information centre. The main focus of this set up was on offering services to certain target groups' .The emergence of the mobile phone has brought new dynamics given that the phone is a personalized gadget and hence the whole concept of target group service has to be reevaluated further .The mobile phone in the current set up represents a persons individual communication tool as opposed to the fixed mobile booth that were viewed in the context communal phones .With these background it is quite clear that the mobile phone has revolutionized many things and as the shift moves from target groups to

personalized service then ,the three features of universal access have to be revaluated in the context of an independent framework of personalized service. There are several initiatives towards achieving access of telecommunication services to people but there has not been an adequate policy shift to address the challenges posed by the emergence of the mobile phone.

1.1 Kenyan mobile phone industry

Kenyan telecommunication sector was liberalized in 1998 (Kenya, Government of Kenya , 1998).Until the act came into play Telkom Kenya (currently Orange) enjoyed monopoly of provision of telecommunications service. The introduction of the aforementioned Act made way for the entry of Safaricom Ltd (Then a subsidiary of Telkom) and Celltel (Currently Zain) in 1999.The whole concept of the enactment of the act was liberalization of the telecommunication sector in Kenya.

The licensees were given mandate to initially roll out services in major towns and main highways (License conditions); the sector since then witnessed tremendous growth both in terms of operators, geographical coverage and subscriber base. Currently there are four mobile operators i.e. Zain, Safaricom, Telkom and Yu.The subscriber base has also increased from fewer than 6,000 subscribers to 18.5 million Kenyans with 84% of the Kenyan population covered (CCK[1], 2008).This growth has not been without drivers, among

[1] CCK-Communication commission of Kenya

them competition, availability of cheap phones ,low tariffs and regulatory intervention at times .

It is worth noting that the Kenyan telecommunication sector has seen tremendous growth and at the same time, challenges to the extend that Celltel has changed ownership more than three times and leading operator in terms of revenue and subscriber base, Safaricom has since been listed on the Kenyan stock exchange, NSE[2]. In effect the telecommunication sector in the Kenya is being run by three major privately owned (private owners being major shareholders) and one public owned company. The most recent development in the sector is the enactment of the communication amendment Act 2009 and the introduction of technology neutral licensing framework[3]. The introduction of the technology neutral licensing framework brings more challenge in defining which services qualify to be rolled out as universal service and at whose cost?. The emergence of wireless broadband even brings the bigger question of what is universal service in the context of the services that are being demanded by the subscribers.

1.2 Policy and Regulatory Environment

The Kenya communication amendment act (2009) provides the framework for regulating the communication industry .This act is the precursor to the act that liberalized the Kenya

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[2] NSE-Nairobi stock exchange

[3] Licensing regime that is not dependant on the technology of use-Network facilities provider, Content service provider and Application service provider

communication sector in the years 1998(Waema, 2007).The 1998 act was an effort by the government to give legislative teeth to the telecommunication sector and this led to the eventual creation of the industry regulator (CCK), National communication secretariat, Kenya Posta and Telkom Kenya as three separate entities.

The sector has seen growth and as noted by Waema (2004) the sector was geared towards having a regulatory environment that investor friendly and provision of modern service .The NRA rolled out a new licensing framework commonly referred to as technology neutral at the beginning of the year 2009.With the rolled out of this regime the sector is geared towards providing world class communication services to the citizens of Kenya. One key aspect of this licensing framework is the separation of national resources like licensing and spectrums from the licenses of operation. This puts the Regulator in vantage point in management of scarce resource and hence looks forward to enhanced competition and an array of services. It is worth noting this had been anticipated since 2004 but has been realized five years down the line .This explains the treacherous path between innovation and legislative agenda.

In simple representation the licenses are

- Network facilities provider-own and operate any form of communication infrastructure

- Application service provider –provide services using the NFP[4] services
- Content service provider-provide any form of content materials.

The current act in force does give a window for Kenya to play in the league of countries recognizing issues like digital signature, content; ecommerce and so forth .The biggest question would be that what all this legislation means to the poor or rural at the lower level of the BOP[5]. Following in the footsteps of the OECD[6] countries and the developed western countries, emerging markets have put in place mechanism to adopting universal access mechanism to serve the rural communities. This approach seems not working in the era of mobile communication infrastructure which has defied the limitations of geographical distances .The real problem lies in socioeconomic issues and such issues can not be handled adequately by USF's[7]. Apparently the current regulatory framework as enshrined in the communication act presupposes that the USF would bridge the gap to ICT services. The licensed operators will contribute 1%of the gross revenues towards USF .The USF is looked at in the context of rollout to achieve access , to a large extend the affordability aspect and the

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[4] NFP-Network facilities provider

[5] BOP-Bottom of pyramid

[6] OECD-organization of economic countries for development

[7] USF-universal service fund

availability aspects are left out and hence quite difficult to acquire the result of affordable service to all.

1.3 Universal Service Access

Universal service was first coined by Theodore Vail, then the president of AT&T[8] during the annual report of the company in 1910.He described "universal service "as "the telephone system should be universal, interdependent and intercommunication, affording opportunity for any subscriber to any exchange to communicate with any other subscriber of any other exchange ".During the years then, the means of communication was dominated by the fixed network, POTs[9]. There has been progressive enhancement of the position and definition of universal service and hence we define universal service in the context of access to health service, internet, power, phones, water and sanitation etc.

ITU[10] defines universal access as a long term objective of making communications facilities available to individuals or household basis .The concept is by definition extended to mean affordability of ICT services to individual users or targeted groups in the society and in this case the rural poor. The developing countries have developed this further to imply provision of services to the uneconomically viable areas. The whole concept of universality in

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[8] AT&T-American telegraph and telecommunication

[9] POTs-Plain old telephones

[10] ITU-International Telecommunication Union

emerging economies has been mirrored to mean accessibility and availability more often leaving behind the affordability concept due to the difficulties related to differential tariff pricing. Universal service refers to having an affordable phone service in every home with a defined minimum level of QOS[11].

Affordability has come under considerable criticism for example Garnhan (2006) argues that affordability and reasonableness are relative terms that left to the subjective judgment of the individual country NRA[12]. For many years universal service has been premised on the provision of services to target groups and thus the emergence of telecentres, Simu ya jamii, cyber communities and payphones .The emergency of the mobile phone and the technology neutral licensing regime calls for an urgent relook at the universal service in the context of it having been for along time modeled around the fixed network. Mobile phone ownership and usage is predominantly on an individual basis as opposed to communal use as was the payphones, telecentres .Whereas there are developed mechanisms that are supported by legislation to address issues of availability, quality of service and access in the fixed network the emergency of converged service poses challenges to universal service in terms realizing the benefits of the three fold definition i.e. availability, accessibility and affordability

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[11] QOS-Quality of service

[12] National Regulatory Authority

Availability, accessibility and affordability have long defined universal service. Even with changing technologies it has been easier to address the component of availability and mainly covered under coverage and usually well espoused in the respective licenses and hence easily enforceable under legislation .For the old system this was catered for by the number of fixed telephone lines in a given area and even with the emergence of wireless technologies this has well been addressed by the signal coverage. Accessibility has been measured by how the availability is realized on a non discriminatory basis to all the users and the pricing aspects and QOS. Whereas the affordability component includes a range of costs related to provision of the ICT services (Intven&Tetrault, 2000).In most developing countries the availability and accessibility are catered for through legislation whereas affordability is left to competition and market forces and in some cases intervention by the NRA. The whole idea of leaving out the requirements in the license, it is assumed that with time market forces will balance out upon full realization of competition. The downside of the assumption has been that not all operators are licensed at the same time and hence to realize competition takes longer than most NRA would anticipate.

1.4 Universal service in Kenya

Kenya has had no policy or strategy for universal access except for regulatory interventions that have been taken to mean universal access. The first attempt towards universal access was done in 2004 when the CCK and IDRC commissioned a study on universal service and strategy for implementation. The study identified areas for intervention and funding sources. This was the first step but was short in implementation due to lack of supporting legislation.

The mobile phone companies have benefited from administrative decisions that have informed halving of spectrum costs in the rural areas through rollout of fixed mobile lines in the rural areas (Simu ya jamii, Sokotele).This initiatives were aimed at addressing access and availability issues but the services were passed on to the users at the same rates as the

economically viable areas. This strategy seemed lacking in addressing the three areas of universal access (Availability, Access & Affordability) which would otherwise inform adoption and acceptance of mobile services by the majority rural population.

The government and the industry regulator with efforts from stakeholders have moved a step forward in addressing universal access through the establishment of the universal service fund in the current act KCA 2009.The Act establishes a fund through which projects may be funded to address the gaps leading to digital divide .The Act does prescribe the source of funds and how it may be run relating to financial matters .As much as this is a step in the right direction , it is lacking in terms of objective and scope, and the monies contributed to the kitty is not clearly stipulated to who benefits from the same and this may open up a loop hole for corruption. Part of the objective of the study is to be able to pinpoint some of the areas where intervention may be needed in mobile telephony

1.5 Phone ownership among the poor

Mobile phone usage in Kenya as mentioned cuts across the class status .To the poor it has become a gadget that can speak their language , a bank through services like MPESA and Zap .The services have been such innovative such that one does not need to have minutes in the phone to reach another subscriber ,call me back by Safaricom .Literally speaking there is rush to reach the poor in the rural areas even without any specific intervention by the regulator .A number of studies have tried to explain the reasons why people own mobile phones and some do converge. (Muhammed Azam ,2007;Asheeta et al.,2008 ;Samuel et al., 2005; de Silva & Zainudeen, 2007; Donner, 2005; Souter et al., 2005; Chakra borty, 2005; and Sridhar & Sridhar, 2007,Delloite, 2008).Some of the reasons advanced are communication with friends, business networking, income source, emergency situations, job search and status symbol.

Kenya had an economic growth rate of 6.1% in 2006 and the transport and communication sector was credited with being one of the key drivers of the growth (Economic survey, 2007)

These kinds of statistics agree with the general consensus that the mobile phone sector adds economic value but the question would be; what value can be attributed to improvement of domestic income among the poor if any. Kenya currently has an estimated population of 38 million people and its estimated half of population (17million) income poverty is at the level KSh 1,562 (rural) KSh 2,913 (urban) per month (Economic trends, 2006).70% of the income poverty is used on food related needs and there is need to establish percentage that is used to power the mobile phone companies profits given most of the subscribers are prepaid (CCK statistics, 2008).

Delloite and GSMA released a study at the end of 2008 and found that mobile telephony accounted for 5.1% of the GDP (Ksh 182,832 million) in the same year; it is against this

backdrop that one would wish to investigate this trend considering the rural poor are continuously being driven into poverty. Kenya currently is experiencing unprecedented famine and lack of food, this leads to the question are the poor people foregoing some essential expenditure in order to own a mobile phone and if so for what reasons? Although some people use mobile phones for "beeping" (Donner, 2007), it is still surprising that over 50 per cent of Kenyans live on less than a dollar per day yet many are able to purchase and use mobile phones. Donner (2007) defined "beeping" as calling a number and hanging up before the mobile owner can pick up the call. Usually a person beeps when he/she has no enough credit or air time and the mobile phone company's have gone a step further by providing the beeping facility free of charge to its subscriber (Safaricom, "please call me ")

Further studies on the use of the mobile phone by poor mainly at the bottom of the pyramid suggest that the real value of the phones in this group of people is valued as a tool of strengthening social ties (Harnan Galperin & Judith Mariscal., 2007;Kathleen et al. ,2008).

These kinds of arguments and study findings would suppose that behind the general assumption that ICT's bring economic improvement, there is a group of people who with the advent of ICT are being driven into poverty via economic substitutions to meet the needs of running a mobile phone.

1.6 Problem Statement

Several studies and research findings generally conclude that ICT's improve the social economic status of the society. Research by Harnan (2007) and Kathleen et al (2008) notes that although the general findings seem to be reflected across the board there are no empirical study findings that show how the poor at the bottom of the pyramid improve there economic status (IDRC, 2007).It is believed some at the bottom poor have had to substitute sanitation, water, health and nutrition needs to maintain phones with overriding principle being to maintain social network .The poor have been historically covered through regulatory intervention mechanism like universal service funds and in the absence of such intervention they have been left to handle the issues by themselves . With mobile phones the reach has basically been fuelled by competition among the operators in the mobile cellular sector. It basically baffles to realize that competition alone has been able to spur growth as opposed to the fixed networks where this could not be realized without UA[13] intervention .This shift call for an empirical research on the relation between poverty income and the cell phone and where to concentrate efforts in applying universal service.

De Silva & Zainudeen (2007) urged for further research to understand the dynamics of the relationship between telecom access and income. They argued that telephones alone can not be a silver bullet that will bring the hundreds of millions of people out of poverty in the

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[13] UA-Universal Access

developing countries. Kenya falls into these category of developing world with the majority living in the rural areas. The telecom industry in Kenya made more than kshs.382billion (Delloite, 2007) and the question would be that are the big corporate running away with billions at the expense of the poor at the bottom of the pyramid or to what extend does this growth reflect a net positive effect to the bottom poor .

The research seeks to find out through a survey the relationship between phone ownership, phone usage, income levels and poverty among the poor at the bottom of the poverty pyramid. The survey places special attention on the percentage of people owning mobile phones, reasons for phone ownership, purpose for the ownership and the key economic cum developmental sacrifices that have to be made to facilitate ownership, maintenance and running of a mobile phone.

The study is pointed in nature i.e. focusing on the rural area of Kakamega East District .At the end of the study we seek to empirically demonstrate the relationship between cell phone ownership and the contribution of the phone to income poverty among the rural in western Kenya with the aim of re-evaluating where efforts have to be placed on universal access. Is it availability, access or affordability of the service?

1.7 Project justification

The project is justified based on a number of factors .Currently there are no empirical studies to support the long held assertion that ICT's improve the economic status of the bottom poor (Harnan, 2007; Kathleen, 2008).The WSIS (2003, 2005) made a case for the inclusion of ICT as one of the pillars economic success and went further to push for "access to ICT by all in the society".

There is no doubt that mobile phone growth in Kenya has been more than a phenomenal growth from a paltry 6,000 subscribers in 1998 to more than 12 million subscribers in 2008.Interestingly 90% of subscribers are on a prepaid platform which would easily inform of the trends adopted in financing of both the initial and operational costs of the subscribers. The WSIS identifies universal access as one of the methods to be adopted for reaching the unreached, however the question moves to the next level, is the problem of affordability of the service to the poor is it a problem or just imagination, if it is how the universal access can be structured. Finally, the study would seek to add to the body of knowledge in the area of empirical research in the low economic areas and the case for the mobile phone as the choice universal service tool in realization of the WSIS [14]declarations specifically tenets touching on ICT and development (WSIS, 2003).The declaration states that access to ICT services in an information society is not to be limited by the socio economic issues and every

[14] WSIS-world summit for information society

person has a right to access information and the necessary technologies have to be in place to support all in the society.

1.8 Research questions

The main questions the research sought to investigate were as a result of drill down of the research objectives .The two basic questions were:

- How does affordability impact mobile phone adoption among the low income earners
- Can there be a Technology Adoption Model that can solve the affordability problem

To adequately investigate the above, specific research questions were as below

- What do the poor[15] use the mobile phone for? - What social economic activities do the poor use the phone for?
- How does the disposal income of the poor compare to phone expenditure?
- Do the poor forego any basic needs to operate a mobile? / If yes what is foregone?
- What is the net effect of owning and using a mobile phone among the bottom poor?
- Does ownership have a positive effect?-what effect?
- Has it had a negative effect?-what effect?

[15] Poor-earning less than 1us dollar per day(united nations definition)

1.9 Objectives

The broad objectives of this project were:-

- To assess the impact of mobile phone adoption among the poor.
- To propose a mobile phone technology adoption model that balances technology adoption and poverty in rural areas

To adequately assess the above, the below sub objectives were considered:-

- To identify various uses of mobile phone among the poor
- To find out the percentage income spent on mobile phone usage
- To isolate any of the basic needs foregone for the sake of phone ownership and usage i.e. Education, Shelter, Sanitation ,Food, Health

2 Chapter 2: Literature Review

ICT development and more explicitly the mobile phone growth in terms of access and penetration has grown to high levels .The reach of the service has seen a population coverage of 77%(25 million) of the Kenyan population covered (Kenya Communication Commission, 2009) The achievement has been with concerted effort by the players and reforms carried by the ICT regulator, the CCK (Waema, 2007).

WSIS tenets and principles call for access to information and communication technologies for all, one of the key players identified in realizing this growth is the respective governments. One of the greatest shortcomings of this approach is the lack of tools of enforcement to actualize the principles in the lives of the bottom poor. Several researchers have including Muhammed Azam, 2007; Asheeta et al., 2008; Samuel et al., 2005; de Silva & Zainudeen, 2007 concur with the role of ICT and related technologies in improving the socio-economic status however one clear message coming out is the lack of any empirical study and or finding showing the real impact of ICT's in improving the life's of the bottom poor.

Samiullah & Rao (2000) are among researchers that believe that ICT's could be used in combating rural and urban poverty and thus foster socio economic development .They further argue that the goal can be achieved if the differential needs of the urban and rural are catered for adequately .The mobile phone penetration is one example of an ICT that has been widely adopted in the developing countries. The most disturbing of this growth is the fact that the bottom poor and the rich all access this service at the same market rate. Even in cases of intervention by the policy makers as suggested by the WSIS (2005), effort is only made for carrying out coverage irrespective of the fact that the service has to be accessed by the rural at a commercial rate.

The GOK of Kenya launched an ICT initiative in tracking of application of certain services procured from the government by the citizens .The services cater for follow up of Identification card application, Passport among many other service .The service is accessed at a flat fee by the citizens irrespective of the economic status of the individual and this completely negates the spirit of WSIS where it is noted that access to information should not be limited by the socioeconomic status of an individual .

Poverty and telecommunication is a subject area that has been reviewed by many authors and some have gone ahead and even assumed poor and rural represent the same thing. Hudson (1984) was one of the first to examine the role of telecommunications in rural development. While it seems obvious that telecommunications contribute to the efficient operation and productive growth of an economy, telecommunications may be a cause, a consequence, and a manifestation of development. Hudson opened up the area of telecommunication to be studied in the context of understanding the developmental issues that are a consequence of telecommunication .Kenny et al (2000) carried one of the first empirical studies to suggest there was an econometrics relationship pointing to telecommunications development and economic development. Most of these studies and as has been corroborated by telecommunication statistics in Kenya, the analysis is basically at a macro economics level not looking at the real impact of telecommunication to the bottom poor.

Their is adequate literature and research findings to support the existence of economic benefits of ICTs and real benefits of the universal service with the aim of reaching all in the society for a knowledgeable society .The studies reviewed are rare in looking at the statistical data on the reach of ICT in the rural areas and by extension to the bottom poor .The study alongside continued review of more literature will seek to determine the real impact of the mobile phone on the pocket of the poor and if it is negative how can the universal access effort be structured to assist with this vulnerable group.

2.1 Digital Divide

Digital divide as mentioned and described by many researchers more often is defined at three levels

- The digital divide is the gap in the ability to use ICTs, measured by the existence of necessary skills
- The digital divide is the gap in actual use of ICTs, measured by the numbers of people who subscribe to the services and the time spent using the service
- The digital divide is the gap in the impact of ICTs use ,measured by the economic and financial effects ICT use could bring to an individual ,an organization or a country at large

It is been widely acknowledged that despite the initial levels of optimisms about ICT adoption in the world bringing populations closer by redefinition of space and time , it has been evident that adoption and eventual benefits follow the line of societal social classification and relations (Norris,20001).The digital divide is widely a complex phenomenon, more complex in the emerging economies defined along social ,political, economical ,technological and educational dimensions .In the early years of ICT explosion, digital divide combined all the mentioned facets looked at them as those who have access and those who do not have access.

For this particular study the definition in; a and b above would well fit in the context of the objective. Mobile phone penetration by way of the number of people with mobile phones is important considering that mobile phone diffusion in the developing countries has taken on a complete different direction as compared to the fixed networks that were a preserve of a few people. Also the digital divide would be looked at in the context of creation of wealth at the macroeconomic &micro economic levels defined by whether the adoption literarily increases an individual's wealth or reduces so does the same apply at the national level. There is no

contention about the impact of ICT at the macro economic level however a lot of research is yet to be done to corroborate the impact at an individual level

Mobile phone adoption, just like other ICTs is normally studied at three levels

- Macro level(Regions and countries)
- Mezzo level (Organizations)
- Micro level (Individuals and households)

2.2 Mobile Phone Adoption at Macro Level

Macro level looks at the status from a holistic impact at the national ,regional and even international level in terms of how a certain aspects is performing from the perspective of generality in relation to other indicators . ICT adoption and by extension the mobile phone has been widely studied in the world at the macro level. Briefly macro level analysis looks at the penetration and usage level at the national levels for country and extends to regions where comparisons could be carried out and the indices used to classify countries in terms of development. The predominant measurements in most of the studies reviewed dwell on the number of mobile subscribers, PC hosts, internet hosts and ARPU[16]. The key elements of ICT at the macro level considers a wide range of factors .One of the most comprehensive outlook of the macro level factors was done by Dewan & Riggins(2005) and had the out look below

[16] ARPU-Average revenue per user

Table 2-1 Factors influencing ICT adoption at the macro level (adapted from Dewan & Riggins, 2005)

Factors	**Relationship**
National income	ICT use and adoption fundamentally related to economic variables such PCI[17] and cost of assets
Access cost	Low services prices are likely to increase adoption
Trade policy	Trade policies and openness would lead to investors hence competition in the concerned sector and in this case mobile phone companies
Competition in the telecommunication sector	Based on the 3 gap model ,this would narrow the digital divide gap
ICT infrastructure	Infrastructure availability has great impact on diffusion of technology. The spread of the networks offering the services beyond the economic areas
Other factors	National culture (key study area),language, education ,technology

[17] PCI-Per capita index

Democracy	Monitored communication ,closed societies

2.3 Mobile Phone Adoption at Mezzo Level

The macro level dynamics play a very important role at the organization level and this has been well articulated in different research related to enterprise resource planning. Waarts and Van Everdingen (2005) demonstrated that three levels could be integrated at the variables level and hence explain such issues as role of macro variables such as national culture in providing explanation of the differences in adoption of ERPs[18] by mid size companies. Their research clearly provides for the strong relationship between the national culture and its influence on innovation and penetration of ICT in organizations

At the mezzo level the key drivers of adoption is the industry competitiveness and supply side activities like marketing .Kollinger and Schade(2003) analyzed factors that influence adoption of e learning and found that digital divide was influenced by the existence of technological interdependencies and organization learning effects .

2.4 Mobile Phone Adoption at Micro Level

At the micro level (individual level), the existing digital divide and by extension the universal service gap could be classified along the below main areas as well articulated by several studies that have been carried out at this level.

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[18] ERP-Enterprise resource planning

Table 2-2: Factors influencing adoption at micro level

Factors influencing adoption at the Micro level	
Social demographics	Most considered elements in the study of social influence on adoption .Covers age, gender, employment status, education level
Economic factors	Income ,wealth ,nature of job, income, subsidies
Infrastructure	Availability of the mobile networks, the- handset availability and access to communal service booth
Geographical factors	Urban, rural demarcation /has interrelation to socio factors –there is always a geographical shift to social shift given disparities in incomes.
Culture and ethnicity	Ethnic and cultural backgrounds have impact on homes access for example in the case of pastoralist communities (mobile vs. fixed networks)
Use skills	Investment in training key, whereas other features n the phone may be cheaper than calling lack of education and neeessary skills skew adoption of certain services.

2.5 Theoretical Foundation: Universal Access Gap and Mobile Technology Adoption

2.5.1 Mobile phone context in TAM

Traditionally the computing environment is defined by a stationary user and terminal equipment .For more than hundred years this has been represented by the fixed network .The fixed network was also like any other computing environment represented by a stationary user and a terminal equipment that always defined the status .The emergence of the mobile has had to create a technological paradigm shift in the use of well known technology adoption models. The mobile phone differs from the conventional office system in several ways and this can be described later

The physical, social and cultural context of a device influences the ways the device is operated or interfaces with the user and the mobile phone emergency has defined our social cultural behavior due the fact that the gadget can be physically moved around. Some of the key differentiators are

- The mobility aspect of the mobile phone is a big differentiator from the stationary office equipment
- Most office equipment is task specific as opposed to the mobile phone. The phone can be used for an array of services as defined by radio ,email ,clock

The mobile phone has four different aspects that have been noted to be unique and hence assistive in the analysis of its adoption among the population on a universal basis (Ruuska-kalliokulju, 2001)

Table 2-3: Uniqueness of mobile phone from other ICT's

Physical context	Size, location ,no manuals, sound etc
Social context	Interaction among the users, entertainment ,privacy issues
Mental context	Users understanding of the handset usage model, features
Technology context	Infrastructure spread ,network availability and quality

2.5.2 Rogers's diffusion model

The Rogers diffusion model was developed for purposes of understanding how technology diffuses into society .This model by and large has been used consistently to explain IT acceptance or rejection in society and or organizations. The model explores aspects that would define an individual or institution either as a technology adopter or non-adopters. This model narrows the propensity of technology adoption into five categories as defined below

- **Innovators 2.5%-**This defines the group of individuals/society that lurch onto technology at its onset when the majority of the people are still wondering and are innovative in use of technology trying very many ideas and adopting the technology .This group forms minority and an example would be an adopter of something like Wimax when everybody is wondering on the sustainability of the technology .This team does not have the fear of untested technology

- **Visionaries /early adopter-13.5%-**The early adopters are the group that upon innovation they ready to adopt and move on with a new technology and just like the innovators they are less fearful of the uncertainties of new technology and they become part of the testing teams of new technology .They potentially form the basis upon which other groups are able to make a decision and adopt technology. This would define the less that 1 million subscribers that took on mobile phones in the early years of the rollout in Kenya.

- **Early majority /pragmatist -34%-**Technology has basically matured and the majorities are comfortable taking on the innovation and largely the diffusion is acceptable to more than fifty percent on a cumulative basis. This defines the

current phase that Kenya and many third world countries are undergoing with the adoption of the mobile phone at an individual level.

- **Late majorities /skeptics-34%.**Very skeptical group but with the influence of adopters they slowly and surely accept the need to adopt technology
- **Laggards-16%.** The very late and unwilling technology adopters due to various reasons and they are unlikely to adopt

Normally a successful innovation will be adopted in that order and just as can be seen in the 3-Gap model the innovators jump into the ship immediately the first foot print is available irrespective of the cost. This coincides with the assumptions of the TAM model where financials and economics are extraneous issues to adoption as it was developed for organizations. Currently the technology of mobile phone could be argued to be at the face of late majorities and the laggards in the Kenyan environment .Penetration is currently at more 40% though it could be argued out that the people who posses and use mobile phones are not necessarily adopters of the technology .For the Kenyan scenario that is an area that can be explored further as a separate study.

2.5.3 TAM

Technology adoption model ,the basis for most of the models that seek to investigate factors influencing adoption ,it is only after the adoption phase has been completed will real change be seen in the access gap matrix. Service could be provided everywhere but lest the population is well informed of the need for adoption then the gap will not be bridged.

TAM has been reviewed severally and works in understanding the underlying phenomenon in ones pursuit TAM has been customized to suit the needs of mobile phone technology and the below illustration delves into the details of the MOPTAM .

2.5.4 MOPTAM: Mobile phone technology adoption model

Judy van biljon and Paul kotze developed the MOPTAM based on four different models with the aim of contextualizing the difference of the mobile phone adoption at the individual level as opposed to IT/Organizations which traditional models understood the dynamics of the society and organizations .It was noted by the Duo that developed this model that they were reviewed several models i.e. UTUAT, TAM, Rogers's diffusion model and TRA.

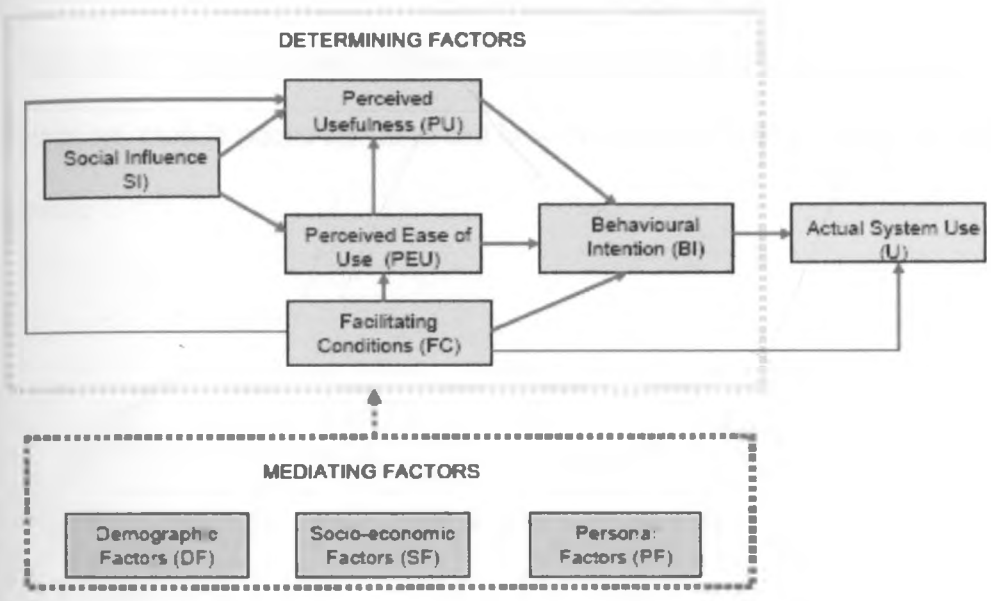

Figure 1: MOPTAM model

2.5.4.1 Determining factors

- Social influence –encompasses the social pressure exerted on an individual by the opinions of other individual s or groups, this also borders on the cultural influence
- Facilitating –refers to the infrastructure reach or spread fits well within the 3Gap model, includes QOS ,Availability, cost of calls, handset costs
- Perceived usefulness –the extend of belief in terms of anticipated benefits
- Perceived ease of use –lack of adoption due to assumed difficult in operating the gadget
- Attitude-individual positive or negative view about the technology e.g. morality ,theft, crime

2.5.4.2 Mediating factors

This represents issues bordering on personal factors in terms of preferences, image, prestige, trust, safety

- Demographic factors represent issues to do with gender ,age ,education, technological advancement
- Socioeconomic factors relate to occupation, income

In spite of all the research which has been done in relation to the above models and how they affect universal service gap in terms of bridging the divide, no research has been done in Kenya on mobile phone adoption and how this relates to the solutions fronted universal service .

3 Chapter 3: Theoretical Framework

Universal access encompassing the three defining criteria of access, affordability and availability has the ultimate objective of technology adoption with the hindsight that eventually the citizen will reap the benefits of globalization. For mobile phone it does imply business transactions are personalized, distance is no longer an issue, tighter social circles that are not limited via transport costs and emergency handling just a call away.

However there are still challenges that bedevil efforts towards complete adoption of mobile phone services with the goal of bridging the digital divide. Very many countries have adopted universal service funds that are enshrined in legislation as a means of achieving this goal. The efforts have been with considerable fruition in relation to coverage which mirrors access and availability .For the Kenyan case where some of the networks have covered as much as 80% [19]of the population the next front for battle towards achieving universal service is mobile phone adoption among the late adopters (Roger's diffusion model).With a majority of the rural areas already covered yet penetration level still at 36.2%(CCK annual report ,2008) it is only right to assume that the problem lies in adoption which is otherwise a mirror of underlying adoption issues that need to be addressed by the policy makers .The 3 Gap model does in simplistic terms explain the path towards achieving universal service

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[19] www.safaricom.co.ke

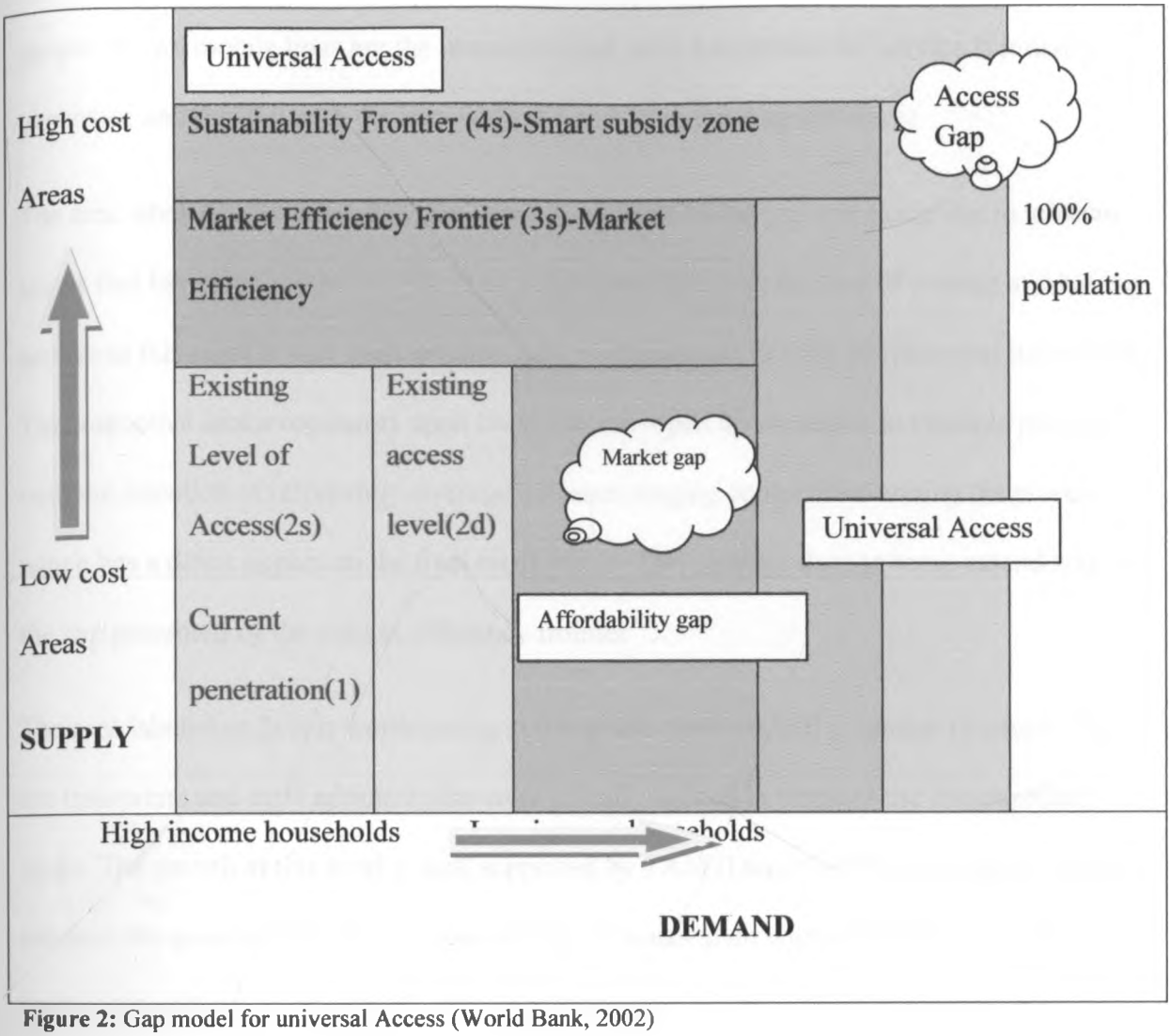

Figure 2: Gap model for universal Access (World Bank, 2002)

The model in figure 2 was developed by researchers of the World Bank in early 2002 with the aim of understanding market gap and the access gap in the advent of liberalization of the telecommunication sector in different parts of the world. The model has gained wide acceptance within the telecommunication policy and economics field as the best framework for understanding the interplay of market forces, regulatory decisions and financial constraints on the development of the telecommunications market .This development s critically focuses on the low income and high cost areas and respective populations.

Initial network rollout obligations are normally enshrined in the specific licensed operators licenses 'and key in the requirements is geographical coverage, availability and quality of

people to own mobile lines are the innovators and early adopters as the service is initially expensive and this fall with the area labeled 1 and 2d in the diagram above.

The area labeled as 3s in the diagram above is a mirror of the gap that exists due to telecom sector that has either monopoly player or a dominant operator, the cost of owning and having service at this stage is very high and normally it is restricted to early adopters and innovators. The respective sector regulators upon liberalization open up the sector to multiple players with the intention of improving coverage and encouraging competition among the players which has a direct impact on the final retail prices .This strategy does to some extend address the gap presented by the market efficiency frontier .

The area labeled as 2s It is worth noting at this phase there are still a number of people that are innovators and early adopters who were initially limited in terms of the geographical reach .The growth at this level is well supported by TAM (Davis, 1989) model as the industry assumes the greatest difficult is access and hence issues to do with affordability are purely extraneous and can be adequately addressed by the competition. The TAM model was developed for organization and as such there are limitations that were not addressed and likewise in the early phase of mobile adoption the same assumptions are taken i.e. Financial and system limitation in terms of coverage is not a hindrance to adoption.

To go beyond the market efficiency gap there has to be a deliberate effort by the government or the delegated organization towards closing the gap .The gap referred to is not just limited to coverage but also the level of affordability of the services to the late adopters who in most cases are the low ones in the BOP

The government of Kenya through subsidies in spectrum costs did push the networks to the next level commonly referred to as smart subsidy, elsewhere in the world this is achieved through target projects which the respective governments pay and expect that eventually the project become economically viable.

Kenya like many other emerging markets has leapt to the true access gap zone without much assistance from the government but through competition and strategic decisions by the companies to rollout services in areas hitherto perceived as non economical. It is hypothesized in this research that the smart subsidy zone in the rollout of mobile services in Kenya is better handled as a technology adoption case rather than an access problem.

Review of existing research show extensive use of the already mentioned models, UTAUT, TRA, Roger diffusion theory in addressing technology adoption issues from individual to organizations. A closer look at this models suggest that with refinement they could be well adapted for use in the effort to handle universal access problems from an adoption front so that there is sustainability .There is considerable research done in relation to culture, the elderly people in adoption and so on .We propose to model our Mobile phone universal service adoption model along the MOPTAM (Judy Van Biljon & Paul Kotze).The key constructs or elements of this model are mainly two i.e. Determining factors and mediating factors. The MOPTAM model was refined from the TAM and contains nine key constructs that influence adoption. In this study we seek to classify adoption in the context of universal service access and central to this is the three factors driving universal access i.e. accessibility, affordability and availability, as explained earlier ,affordability is at the centre of adoption and it is a major regulatory issue. Industry players and the Regulator are the main players when it comes to setting pace of the industry and hence introduction of the tenth construct that would affect adoption, Regulatory environment. The regulatory environment would set the necessary mechanisms for tariff balancing and handset cost for the bottom poor and

inform many other institutional and economic issues that are key to handling the needs of the bottom poor.

The key issues that were investigated were *regulatory environment, demographics, socio economic factors, and personal factors, actual adoption (universal adoption and use).*

3.1 Definition of elements of the model

3.1.1 Social Influence

Social influence mainly referred to as the subjective norm in the Theory of reasoned action (TRA) by Fishbein et al (1975).This does refer to adoption being as a result of influence from other individual and in the MOPTAM model social influence include cultural aspects as recommended by Urbaczewski(2002). For example in households where the men have culturally assumed headship then this could influence the adoption or non adoption of a mobile phone .This element in our research given that the set up is in the rural areas where the population is assumed to be conservative then we would expect in typical households the men would have a higher adoption rates of the mobile than the female in married set up as opposed to widowed households or single households. This social influence was investigated on the basis of understanding why part of the population would adopt a mobile phone at a cost higher than their incomes despite the existence of communal phones (Simu ya jamii)

3.1.2 Perceived ease of use

Perceived ease of use refers to extend individual s believe the use of the phone is free from any effort as defined by Davis (1989) in the TAM model. In our research this element was investigated on the basis of understanding why one would prefer making a call instead of the SMS whereas the later is far cheaper than the former.

3.1.3 Perceived use

This refers to the benefit that one sees in order to adopt the mobile phone technology and thus take a set towards acquiring one .This element is also well defined in the TAM model and other models such as UTAUT. The use of the phone could be commercial or social and this

assumed benefit does affect whether one adopts a technology or not. The adoption is what eventually bridges the digital divide hence narrows the access gap.

3.1.4 Attitude

Attitude refers to the user's desirability to use a system .In the MOPTAM model perceived usefulness and ease of use solely determine the attitude towards adoption .In our research we also looked at the regulatory environment as factors that could influence attitude. For example a regulatory mechanism like subscriber registration could create a negative attitude in some people who prefer living a private life. A feature such as location updates unintentionally creates a case for suspicion of being monitored and affects attitude towards adoption.

3.1.5 Behavioral intention

Behavioral intention is influenced by attitude and perceived usefulness. The intentions upon being actualized gives ground for actual adoption and eventually narrow the access gap.

3.1.6 Regulatory environment

The regulatory environment focuses on the role of the and the industry players .In the UTAUM model this is well represented by the external variable .Regulatory intervention such subscriber registration, Tariff capping, tax exemptions, number of licensed operators, license condition's monitoring do influence perception .In this context we have the actions by the regulator and the operators .cost of handset and tariff formulation is a twin role that can be jointly taken by the operator and regulator so that the low economic persons are not disadvantage by uniform rates and policies that are not cognizant of the differences presented by the socio economic and demographic issues .In the original MOPTAM this represents the facilitating conditions for adoption.

3.1.7 Access gap

Refers to the gap presented in mobile phone adoption due to the affordability gap presented by the socio economic ,demographic and personal factors .This gap can only be narrowed with an interplay between Regulatory factors and the mediating factors .Factors like the number of sim cards owned by an individual could impact on the real penetration of mobile phones.

3.1.8 Demographic factors

This is variables like age, gender and education .They are widely accepted variable for research in ICT and related technologies.

3.1.9 Socio economic factors.

This refers to variables related to employment, job status, marital status and income.

3.1.10 Personal factors

This refers to personal preference and users beliefs as to the benefit of the mobile phone. This also borders on issues like prestige, class, complexity, observability.

Table 3-1: Variables influencing mobile phone adoption, captured by different models

Factors /Models	TAM	UTAUT	Kwon and Chidambaram	Mobile phone scenario
Social Influence	no	Yes	Yes	H.Geser (2004),Lee,w.j& et al(2002)
Perceived ease of use	yes	yes	Yes	Donner(2004),Venkatesh,v(2000)
Perceived usefulness	no	yes	Yes	Donner(2004),Venkatesh,V(2000)
Facilitating conditions	no	yes	No	
Attitude	yes	no	No	
Behavioral intention	Yes	yes	yes	
Actual system use	yes	Yes	Yes	Donner(2004),Venkatesh,V(2000)
Demographics	External variables	No	Yes	
Social economic	External variable	No	Yes	
Personal	No	No	No	

Regulatory environment	External Variable	Organizational structure	No	

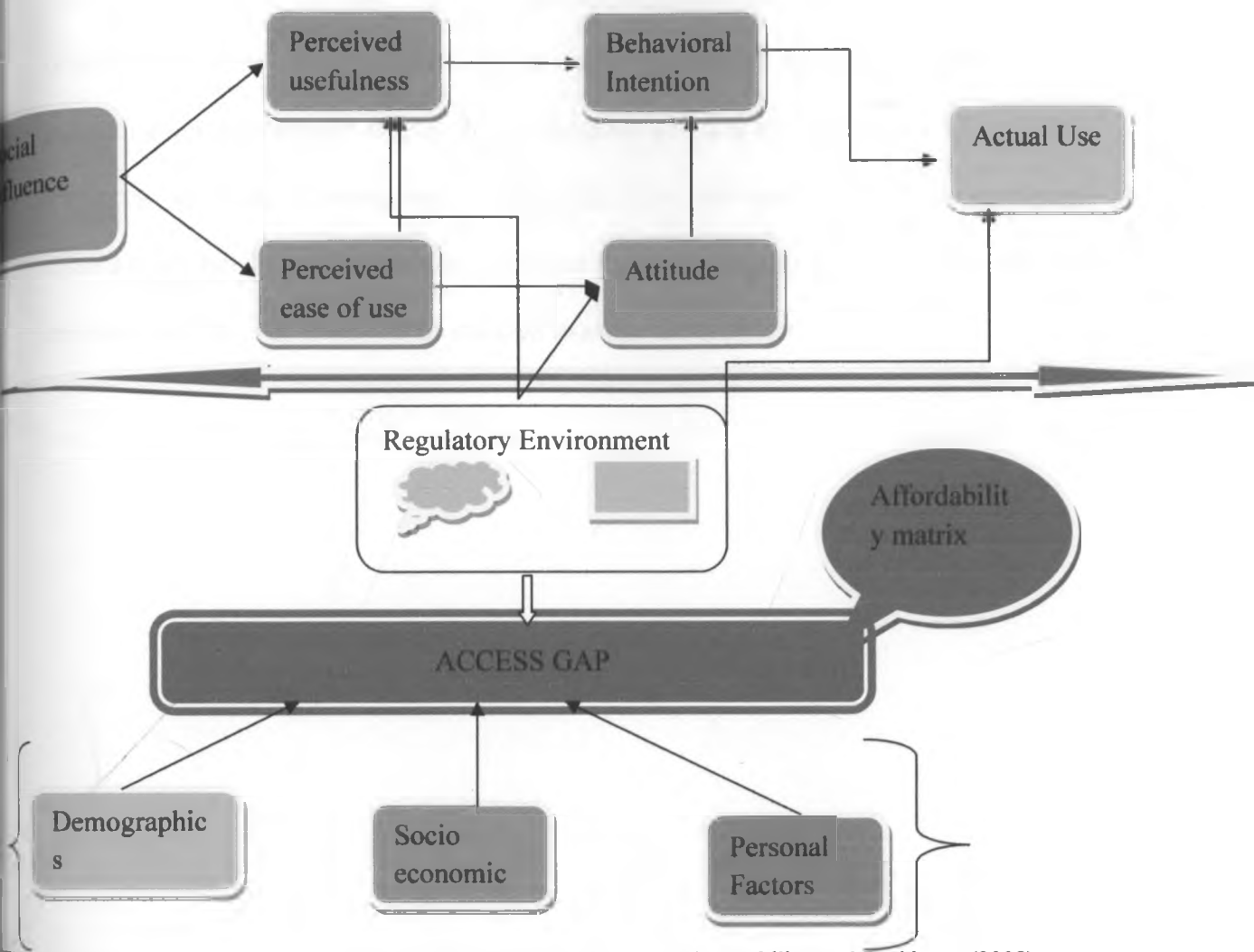

Figure 3: Proposed Research model (Adapted from the MOPTAM by Judy van biljon and Paul kotze (2008)

Research shows that the mobile operators and the national industry regulator can influence the reach of service and eventual adoption of mobile phone by the citizens(Waema,2007).The adoption does indeed mean that the gap at the end tier of the subsidy zone can be closed. Reviewing the MOPTAM it was evident that the facilitating conditions have more to do with the network providers in meeting their mandate as obligated in specific licenses and the NRA having a strong oversight role in fostering competition, price matrix that is specific to the low economic citizens, tax regime that makes prices of handset cheaper, and proper tariff

government in setting up policies and strategies that are able to address diversity in socio economic status ,demographic outlays in relation to gender, age and related issues .It is thus proposed that the telecom operators and government forms the tier that feeds into the mediating tier classified as regulatory environment and it is key in closing the gap within the access levels and is by and large assumed the TAM part remains as is. The cost aspects related to the handset and the mobile tariffs are the balancing acts that support the regulatory environment tier .The level will be referred to as the industry tier.

3.2 Elements under investigation

Several elements were under investigation through a developed questionnaire for the survey as presented in the model and took the below format

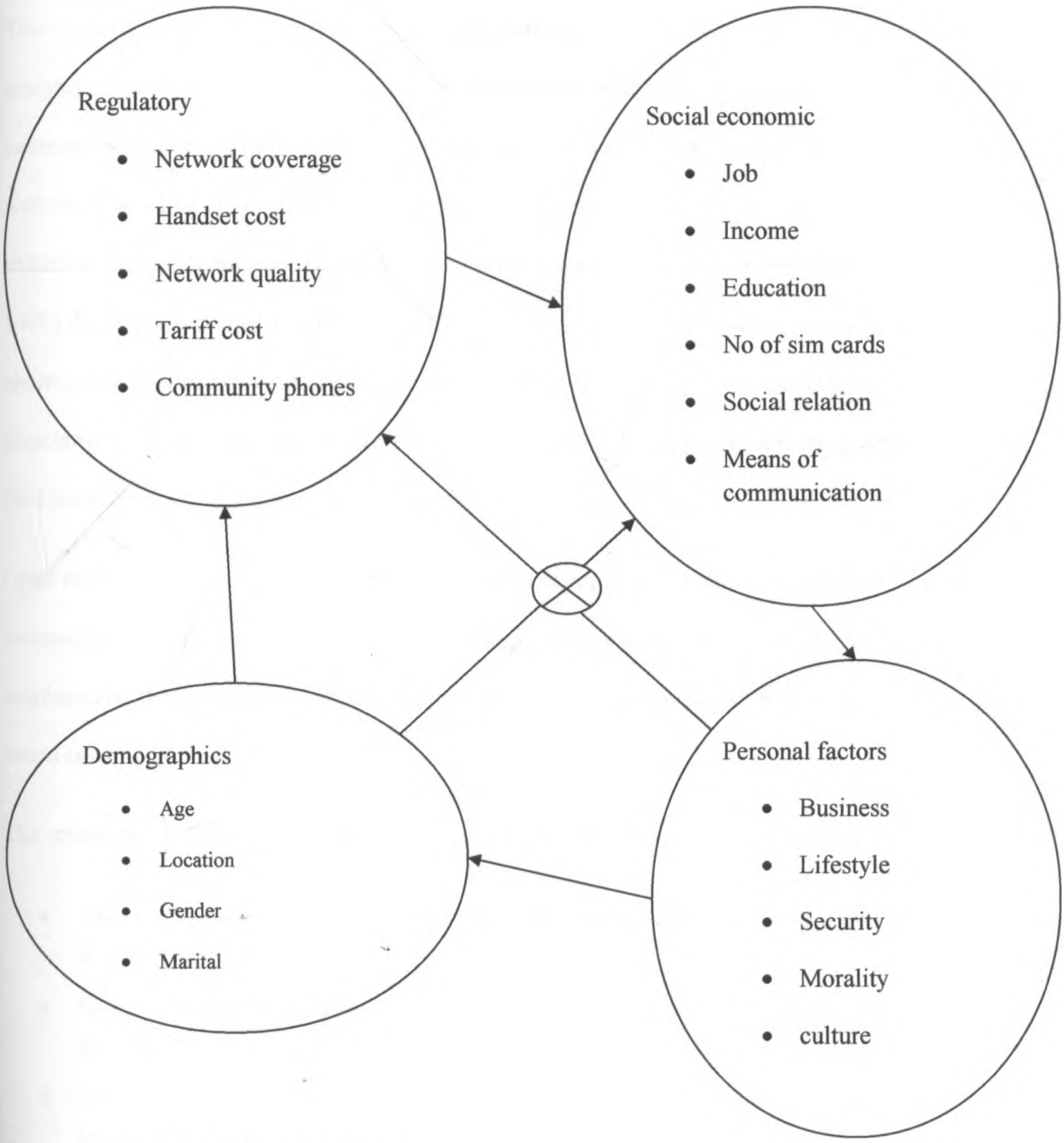

Figure 4: Elements considered in the research

4 Chapter 4: Research Methodology

4.1 Research Design & Setting

The research was descriptive in nature and quantitative methods were used in collection and analysis of quantitative data upon which conclusion were empirically derived. The examination of the situation on the ground was "as is "and no attempt during the research were the prevailing circumstances altered. Descriptive research is undertaken by getting information directly from the respondents about the problem (Mugenda & Mugenda, 1999).Descriptive studies as noted in several researches basically deals with describing characteristics of particular individual or a group and in this case, it represented the rural population of Kakamega East district. Case study method utilizing Questionnaire and face to face interviews was utilized during the survey.

Open ended and closed questions were developed to capture the details of the required information. In addition to the above attitude and perception questions (Liker t Scale) were employed by the researcher in getting the perceptions of the participants about certain attitude based constructs.

The researcher's choice of the geographical areas was motivated by the following factors.

- Had good existing relations with the community and the administration –easier to distribute the questionnaire
- Slums present artificial poverty whereas the area gives a natural presentation of life and culture
- Had statistics that can easily relate with the national poverty figures ,63%(economic survey, 2007)
- Home area.

4.2 Sampling and sampling procedure

The researcher employed area sampling method to come up with the initial number of areas to be used for the research. The sample frame, population of kaka mega east district was 138 000 people (Kenya Bureau of statistics 2006).Using statistical calculator for this kind of research based on the population, a sample size of 597 participants was required. This was based on a confidence level of 95% and a statistical margin of error of -+3%.A total of 600 questionnaires were developed for the purpose of the research. The area of choice had network coverage representing at least the three major operators in Kenya i.e. orange, Safaricom, and Zain and hence well represented in terms of competition and array of services to the subscribers and population.

4.3 Research Instrument

Empirical research faces many obstacles .Finding research evidence on the actual mobile phone adoption, usage and the access gap is a real challenge .This fact was also identified in research on internet usage in Kenya by Waema et al (2007).With such background there was not an existing specific research instrument specifically developed for collection of data from the demand side of the telecommunication industry.

The questionnaire was aimed at finding out different aspects of mobile phone adoption in relation to demographics, socioeconomic issues and personal factors with the aim of relating it to the identified gap in universal access. The questions in part 1 were based on factual demographic details like location, age, education and marital status. These questions were meant to highlight the demographic and social aspects of the participants as per the proposed model.

Questions related to adoption of phone were in part II and they mainly investigated issues on the number of sim cards, whether one owns a phone or if not the reasons. Also critical was

the main usage trends of the phone and the recharge denominations .The questions were in the below categories.

1) Income level,

2) Phone ownership and usage

3) Reasons for adoption

4) Phone maintenance,

5) Social elements that compete with phone for money

6) Perception questions on transport substitution, employment, social cultural fabric

7) Top regulatory intervention for adoption and universal use.

The questionnaire had a total of 27 questions with some having more than 2 sub questions. The questionnaire had a total of 49 variables for analyses by spss software

Concerning demographic questions, we asked the respondents' age, gender, marital status, occupation, and area of residence. Firstly, we hypothesized that older and younger people may have different views about this study. Therefore, the age structure was considered important for identifying the age group that most use/own mobile phones, and for the purpose of expressing variation of opinions about mobile phone usage/ownership and whether any of the groups strain to maintain and operate mobile phones.

Secondly, as it is widely believed that more men than women own/use mobile phones in rural Kenya, we wanted to see also whether this hypothesis turned out to be true. Thirdly, we aimed at finding out whether marital status of respondents correlated with mobile phones ownership or use in the study area. Fourthly, it is generally believed that salaried and business people utilize and own mobile phones more than unsalaried people. Therefore, we

included a question about respondents' occupation. Fifthly, we wished to find out the different groups whether in their own opinion it was necessary for everybody to own a mobile phone. Also it was the intention of the research to find out from the two genders classified along age their perception of mobile phone improving theirs social economics status .Lastly but not least was to find out from the respondents what is important to them in the context of regulatory intervention and how this correlates with age and gender.

4.4 Pilot Survey

A pilot study was carried out on the 26th May 2009 at Kangemi Nairobi with a total of 46 questionnaires. The main reason for the pilot was to verify the validity and accuracy of the questionnaires. The questionnaires were administered by the researchers with three assistants. All the questionnaires were filled to the satisfaction of the researcher and the finding helped in fine tuning the research tool.

Gender distribution for the pilot survey

Table 4-1: Pilot survey, Gender distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	27	58.7	58.7	58.7
	Female	19	41.3	41.3	100.0
	Total	46	100.0	100.0	

Table 4-2: Age distribution for Pilot survey

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10-18 years	3	6.5	6.5	6.5
	19-25 years	19	41.3	41.3	47.8
	26-35 years	16	34.8	34.8	82.6
	36-55 years	6	13.0	13.0	95.7
	56 years and above	2	4.3	4.3	100.0
	Total	46	100.0	100.0	

The population was concentrated in 19-25 and 26-35 years which reflects on the percentage of the national population distribution, this item was key in gauging whether the tool could be well understood by all the age groups that were to be interviewed during the research

The pilot survey as mentioned was for checking the tool to make sure it met the criteria of reliability, validity and practicality as mentioned by Kothari (2004), this will go along way in addressing issues of interpretability of the findings of the final results.

4.5 Field Study

The field study was carried out between 5th and 12th June 2009 in Kakamega East district .Prior to the administering of questionnaires, training on the questionnaire and how to carry out the interviews was conducted for the research assistants. A total of 7 research assistants were trained with 1 dropping out .The team included two postgraduate students at the university of Nairobi,2 undergraduate and 3 teachers .They varied in the age distribution to cater for the different categories of the population to be interviewed .As noted in several research in mobile phone adoption and usage it was necessary for the researcher to eliminate any likely preconceived biases that may arise hence age was very important as it is acknowledged that age influences mobile adoption (kwon and Chidambaram 2000;kleinjen,wetzels et al 2004).The researcher had in addition one supervisor for validation

of the filling of the questionnaire and checking on anomalies that may suggest that the questionnaires were doctored.

The teams were grouped in areas to visit and in total 9 main centers were visited for the survey. The population was centered at Shinyalu, Khayega, Murhanda, Mukumu, Mugomari, Ilesi, Shitochi and Vihulu.

4.6 Data Collection and Analysis

Editing is vital role in the process of carrying out data processing and indeed as noted by Kothari (2004) involves careful scrutiny of completed questionnaires to assure that Data collected is accurate and consistent with the facts gathered and have been properly arranged to assure accurate coding and tabulation.

Central mode of editing was chosen over field editing, the central editing was better given that the researcher could review the entire questionnaire at the end of the day with the assistance of two assistants. Individual questionnaires could be easily tracked to the particular interviewer as they had the date, time and name and the location of the interview. This assisted the editors to refer easily in case of abbreviated inputs on the questionnaires

To make analysis friendly the questionnaire was coded on the basis of every questions and numerals assigned. SPSS software tool was used for carrying out analysis that was based on subject theme, simple statistical correlation and cross tabulation analysis was used to carry out quantitative analysis that was used to inform conclusions on certain constructs.

4.7 Reliability of Data Collected

The data that was collected by the questionnaires was checked for reliability using SPSS, with an alpha level of 0.9541 and thus demonstrated a confidence in the reliability of the data that was collected.

Table 4-3: Reliability analysis

****** Method 1 (space saver) will be used for this analysis ******

RELIABILITY ANALYSIS - SCALE (ALPHA)

1.	Q1	Gender
2.	Q0.4	Current residence
3.	Q2	Age in years
4.	Q3	Marital status
5.	Q4.1	What level of education?
6.	Q5	What is your employment status?
7.	Q6	What is your daily income in Kshs?
8.	Q7.1	What do you use for communication?
9.	Q7.2	If not mobile phone, why not?
10.	Q8	How many mobile phone sim cards do you h
11.	Q8.1	If "more than one", is they from one op
12.	Q8.2	reasons for your choice
13.	Q9.1	How did you obtain your mobile phone?
14.	Q9.2	If bought, how much did the phone cost y
15.	Q10	What is your main reason for owning and
16.	Q11	Identify from the below choices what bes
17.	Q12	Which of these best describes your reason?
18.	Q13.1	Do you carry out direct top up of airtime?
19.	Q13.2	If yes, how many times per day?
20.	Q13.3	If no, how do you receive your airtime?
21.	Q14	For your airtime top up, which denomination
22.	Q15.1	Why this choice of denomination for recharge
23.	Q16.1	In the course of a single communication,
24.	Q16.2	Give reasons for choice
25.	Q17.1	What is the source of income for your phone maintenance?
26.	Q18.1	Do you sometimes forego any of your basic?
27.	Q18.2	If yes, which items have you most sacrifice?
28.	Q19.1	Are there instances when you have had to
29.	Q19.2	Give reasons for your answer
30.	Q20	Do you agree with this statement: "Mobil
31.	Q21	Do you agree with this statement: "My in
32.	Q22	Do you agree with this statement: "The m
33.	Q23	Do you agree with this statement: "The m
34.	Q25	Do you agree with this statement: "The m
35.	Q24	Do you agree with this statement: "The c
36.	Q26.1	In your opinion is it important for ever
37.	Q26.2A	if yes reasons for your answer in 26.1 1
38.	Q26.2B	if yes reason for your answer in 26.1 2n
39.	Q26.2C	if yes reason for your answer in 26.1 3r
40.	Q27.1	What would you like to see change in the
41.	Q27.2	What would you like to see change in the
42.	Q27.3	What would you like to see change in the
43.	Q27.4	What would you like to see change in the
44.	Q27.5	What would you like to see change in the

*(*full information on the truncated sentences can be found in the questionnaire in Appendix B)*

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 444.0 N of Items = 44

Alpha = .9541

5 Chapter 5: Results and Findings

This chapter evaluates& analyzes the findings of the reports using statistical methods among them frequencies, correlation analysis and cross tabulation .Using this statistics a number of inferences are made and form the basis for discussions and conclusion of the study .The results ran the whole spectrum of the research.

5.1 Gender distribution

The general information gathered from the research found out that the interviews were done on a fairly balanced scale i.e. 45.3% female and 54.7% male

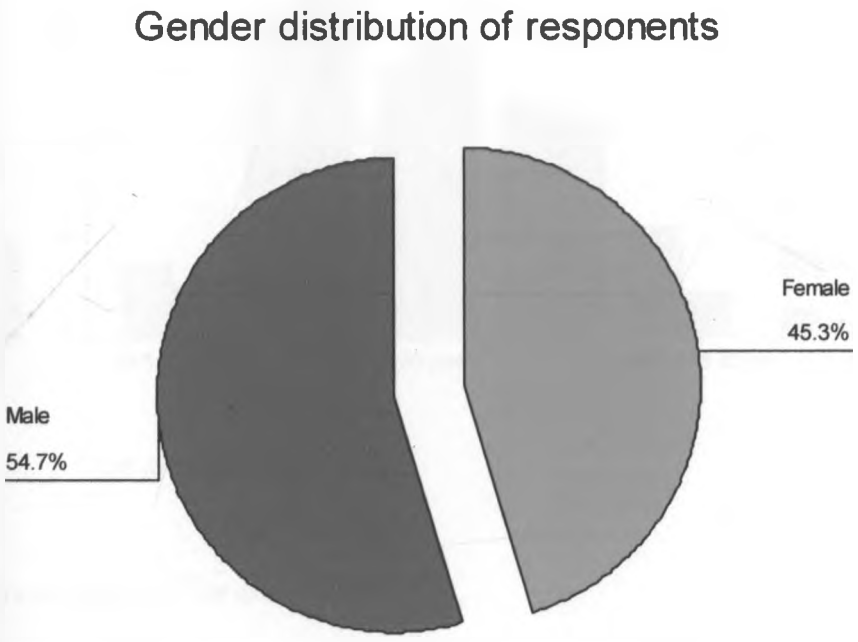

Figure 5: Gender distribution

The general finding of the study represent a balanced view and not biased towards a certain gender group. Several studies as already covered in the previous chapter's mention that adoption models are not sensitive to the gender groups; hence models are not biased based on the sexes and this assertion was tested using correlation analysis.

5.2 Age distribution based on gender

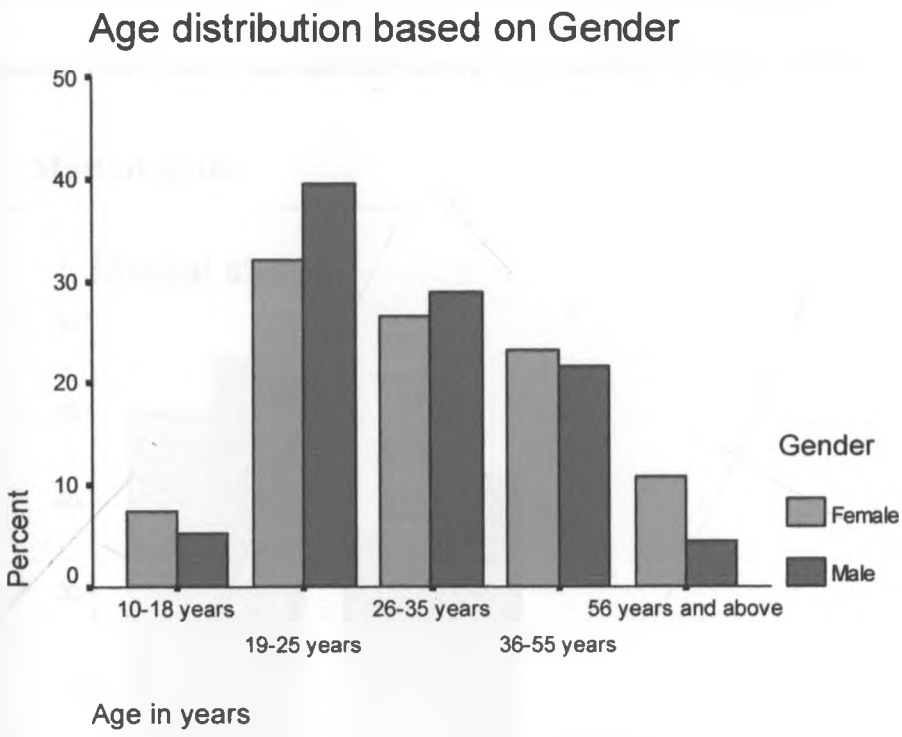

Figure 6: Gender vs. Age distribution

The population that participated in research was predominantly below fifty five years i.e. 91.6% with the age above fifty six years making just 8%.With a confirmed life expectancy at just less than 50 years it is assumed that the results could be replicable in other rural areas whose demographics border on this kind of distribution.

The age 10-35 years accounted for 68% of the respondents which is well within the national population distribution currently suggesting that the age below 40 years account for 60%.

The distribution based on age was a critical factor in this research given the already discussed aspect of age being a factor in most technology models, the older group are usually slow to accepting and adopting of technology whereas the young are fast to adopt even though the use and reason for adoption may be varied .The female gender was found to be highest in the age group above 55 years the male seemed to reduce as the age moves towards higher level. Based on this statistics it would not surprise to find the female lacking in adoption in the advanced years due to the cultural factors surrounding the family unit.

5.3 Marital status

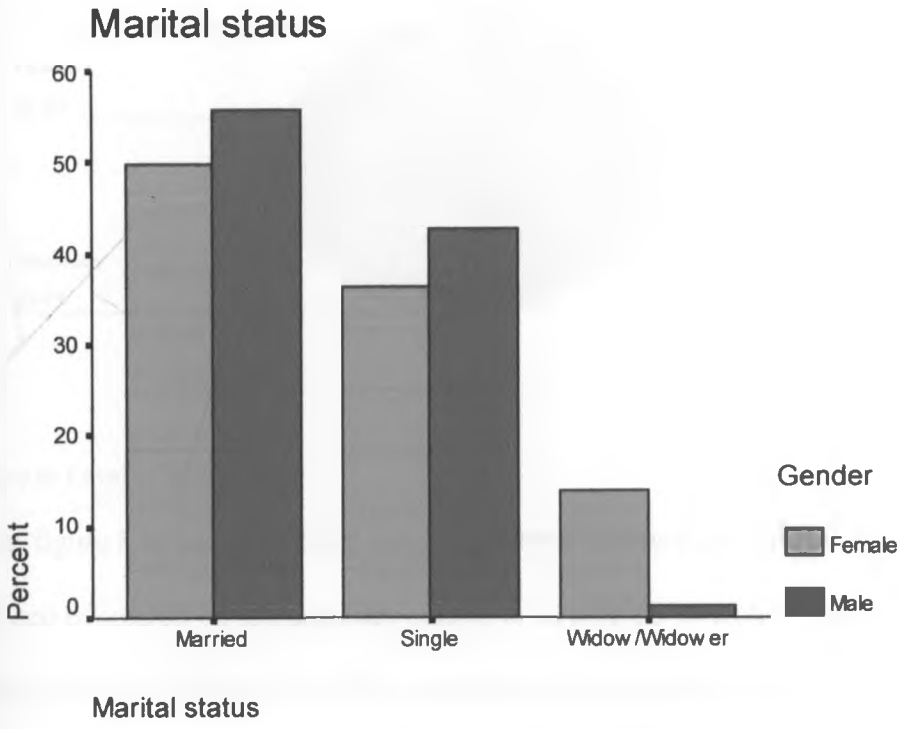

Figure 7: Marital status

The distribution in figure 7 in terms of marital status was use d to assess if the same has any border on the usage patterns and whether one owns a phone .Curious enough was the percentage of women who live in a state of widowhood and if then they are affected in ICT adoption due to their status. This item will be shown later in the analysis as to how many own

phones and in their own opinion how it could be rectified. With strong cultural biases in this rural community this would suggest that more men have access to mobile phones than women due to being disadvantaged by widowhood. Men are actively covered in all the three classes except that when it came to widowhood the men seemed to be much fewer.

5.4 Education level

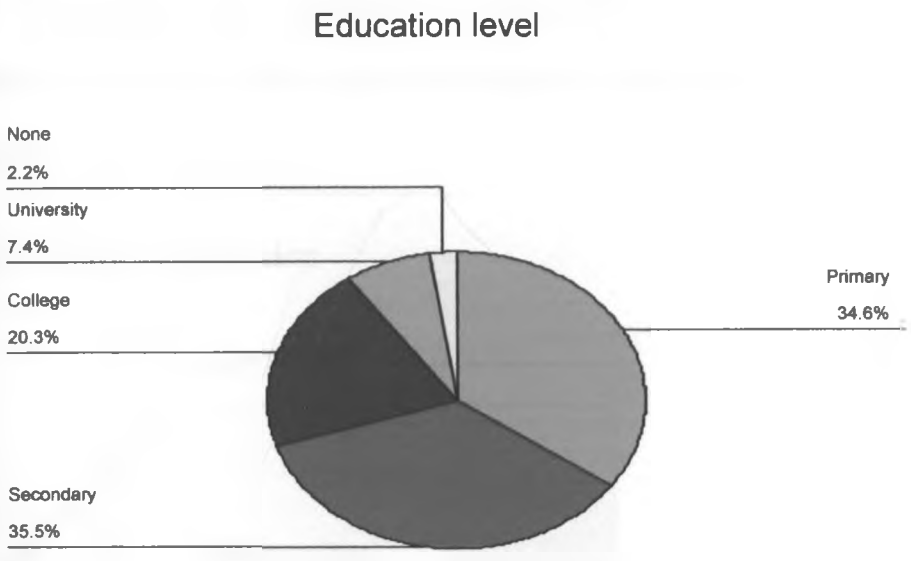

Figure 8: Level of Education

From figure 8 it was quite clear that cumulatively more than 70% of the population has attained education up to secondary school level and 2.5 % with no formal schooling .This statistics has a relationship with the statistics on employment and level of income as they are correlated .With the advent of broadband and related technologies it is clear that to close the gap of access then something has to be done on the education front so that eventually innovation will create jobs and hence improve on ICT utilization or otherwise Kenya will be a nation of consumers .

The primary schooling and no formal education account for 39% and this is a group that would make it impossible in terms full adoption and utilization of the mobile phone, it is an

area that will have to relook at if we are to move to technologies that have sophistication in terms of usage and access like computers. Based on our model, the majority of the persons would be expected to be involved in the informal sector due to the limitation in education and as such would also reflect on the usage models of the phone in terms of amount spent on calls.

The lesser educated have access to low paying jobs or in the informal sector where the earnings are less predictable and it is expected the usage patterns among this people would be volatile.

5.5 Income distribution

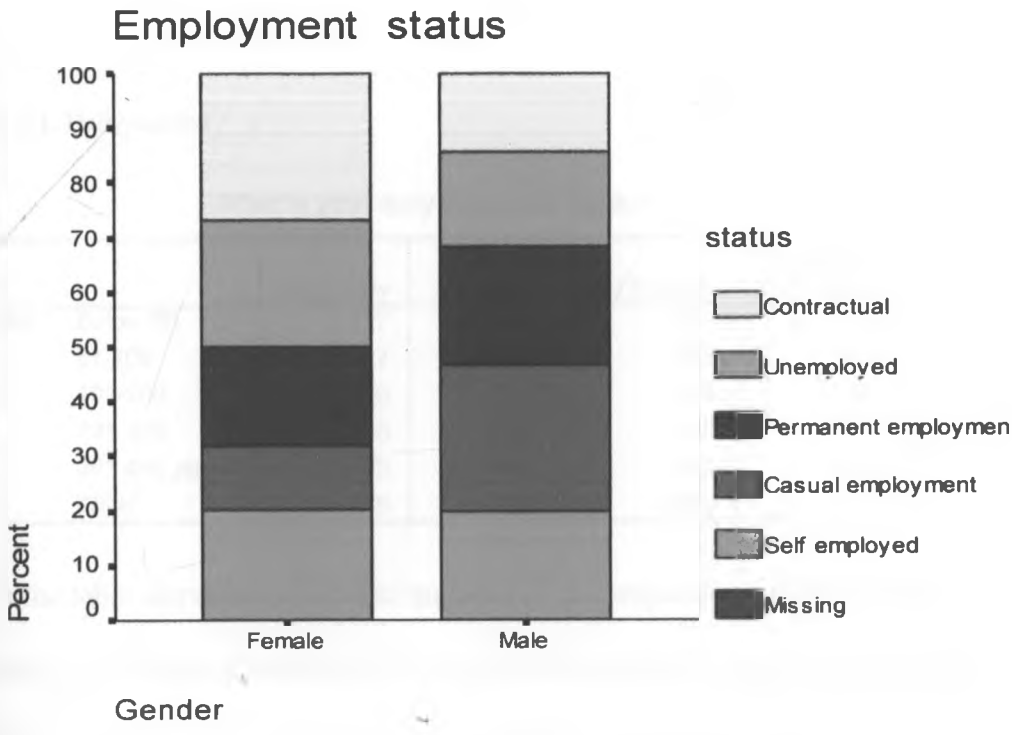

Figure 9: Employment status

Figure 9 shows the bulk of the people that were interviewed only about 20% are engaged in permanent employment and more women are self employed than men, with the women leading in unemployed and this directly correlates with the monthly earning of each category.

With these statistics we expect that the earning of the women will be far less than the men. This finding is well supported by the assumption taken on the education level acquired. In the digital divide debate the women seem to be more marginalized and the context of full adoption of the mobile phone, more needs to be done at the policy level to address some of the shortcomings on a gender basis.

Just as universal access in the early years was based on uneconomical areas in revamping this has to address the gender issues with a view of addressing the gap.

Without intervention it would seem sooner than later the rural women may be disadvantaged and we started seeing adoption being influenced by gender same way as the age factor.

Table 5-1: Daily income

What is your daily income in Kshs.?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 80	177	39.4	39.4	39.4
	81-100	87	19.4	19.4	58.8
	101-200	76	16.9	16.9	75.7
	201-300	36	8.0	8.0	83.7
	301 and above	73	16.3	16.3	100.0
	Total	449	100.0	100.0	

From the table above it is clear that majority of the respondents earn less than us dollars 1.25 per day, this majority represent 58.8% .The daily income for this group is far below the national minimum wage by 50% implying that the phone ownership and maintenance is more of a burden to this group of people .The earnings per day on average reflect on the 50% statistics of the people globally who earn less than 2 dollars and who in practical terms even if access to ICT service was available it is impossible to close the gap unless the economic issues are handled.

The cross tabulation shown in table5-2 shows that the in the low income group, the mode of acquisition of the phone is via gifts and this figure does reduce considerable as the income increases and on second line, the low income groups represent the highest number of non adopters of the mobile phone.

5.6 Cross tabulation for income and method of phone acquisition, inferential conclusion

Table 5-2: Cross tabulation daily income vs. Phone Acquisition method

How did you obtain your mobile phone? * What is your daily income in Kshs.? Crosstabulation

Count

		What is your daily income in Kshs.?					
		Below 80	81-100	101-200	201-300	301 and above	Total
How did you obtain your mobile phone?	Gifts	49	12	10	2	5	78
	Employer's	1	1		3	2	7
	Bought	77	55	56	26	62	276
	Not Applicable	47	18	10	5	3	83
Total		174	86	76	36	72	444

From the cross tabulation phone acquisition was mainly through buying and gifts .The highest group of people who receive phone through gifts are the low income groups at the below Kshs 80 per day .The method of acquisition changes as the income levels increase and review of table 5-2 shows that most of the phones acquired are less than five thousands and no phones with internet capability can be acquired at this value and the issue of affordability comes into great focus that needs to be addressed in the context of differential pricing .

The low income groups depend on buying low end phones and gifts in equal measure and this implies that there has to be either a strategy of empowering this class of people through either job creation to raise their income levels or a regulatory mechanism that can make it possible to reduce the cost of handset and slowly move towards compact phones that are able to be handle future technologies at a lower cost .Technology keeps changing every time and it would be difficult to have this group of people connected to the low end phones to migrate to the next level .

In essence they will always be late adopters , for example 3G and Wimax has been exploited in usage and yet with the kind of phone available in the rural areas it will be a while before such services are offered to the masses despite the fact that the networks have already deployed this systems.

5.7 Means of communication

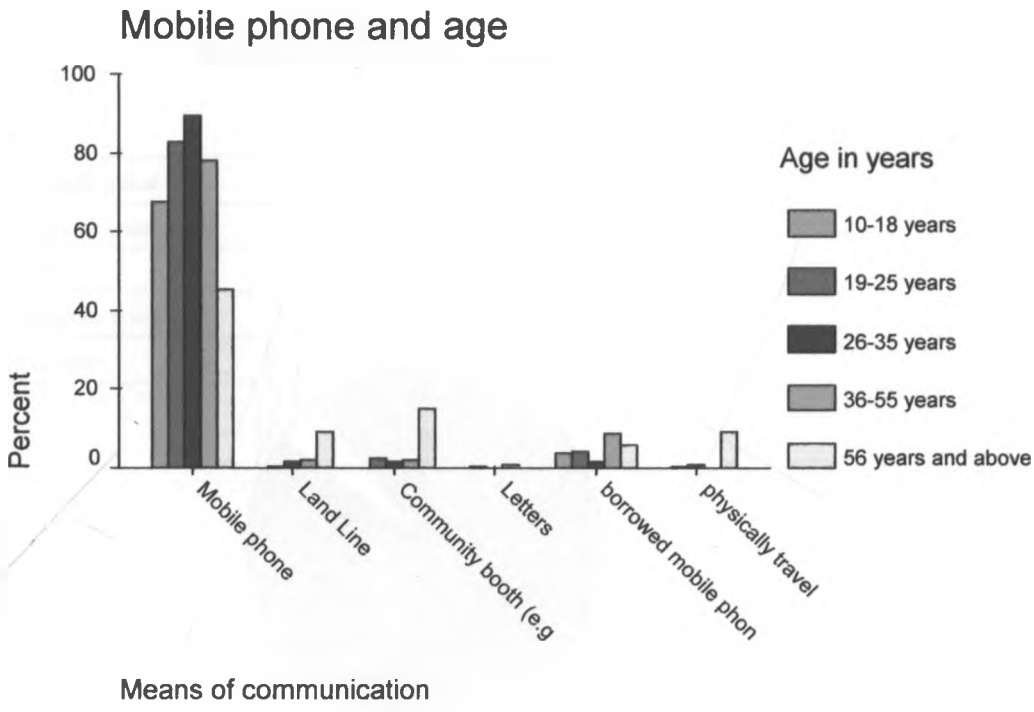

Figure 10: Method of communication

Age is an issue when it comes to adoption as it is well in figure 10, higher percentages of the elderly use different means of communication as compared to the other age groups whose main mean of communication is the mobile phone. Mobile phone usage was greatest in the ages ranging from 19-35 years as the age advances there was a drop in mobile phone adoption and became quite drastic above 56 years. The pick period for use of the mobile phone usage and adoption was at the age between 26-35, this is also the age most people are in employment it rings a bell on the earning capacity, it was lowest in the age above 55years which could be explained by adoption factors related to age and may be it is also an age when most have retired and may not be actively engaged in social activities.

This finding was well supported by the finding of the research on predicting technology adoption and acceptance among the elderly (Karen Renaud & Judy Van Biljon 2007).It informs that when carrying design for usage of mobile phone framework ,age is a key component of the issue that have to be considered .

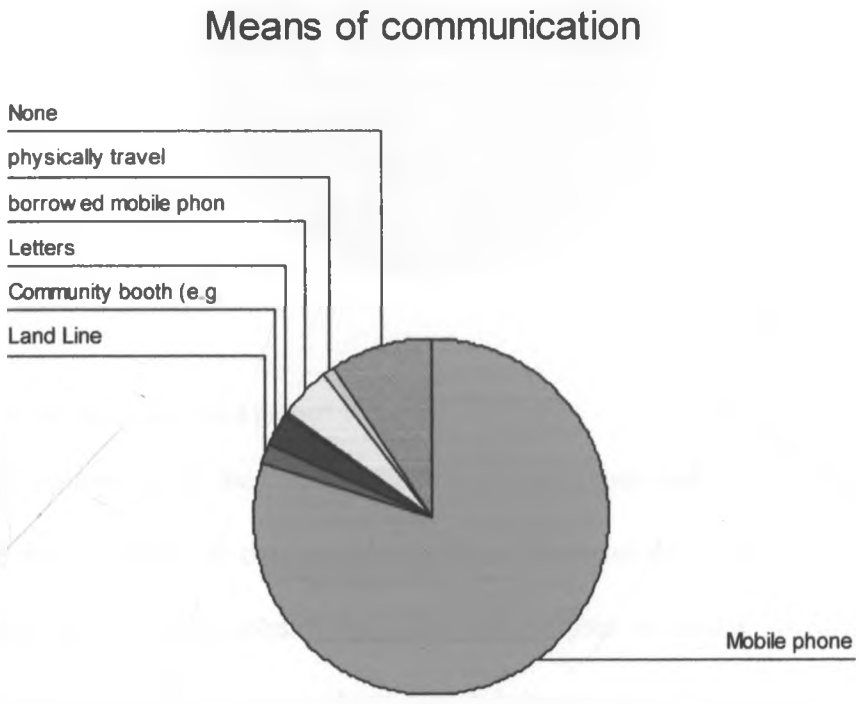

Figure 11: Communication tool

Figure 11shows that most of the people interviewed had a mobile phone and the networks were available .This represents 80% of the respondents .Only 9% of the respondents did not have an access to any means of communication save for the traditional methods .This figures shows as already argued out that the problem that exists in mobile phone penetration is not access neither adoption but affordability of the service.

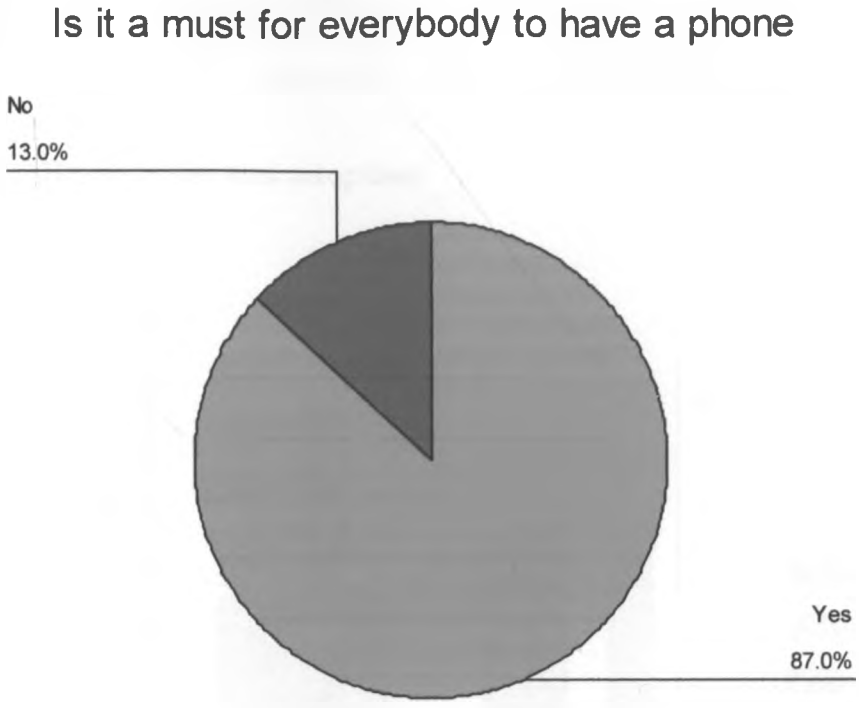

Figure 12: Must one own a phone?

In the opinion of all the respondents it was quiet clear that there is consensus that there is need for everybody to own a mobile phone. However this varied in term of the reason for this consensus as shall be seen in the follow-up analysis. In total 87 % of the respondents' content that everybody has to own a phone which brings to fore the argument that indeed mobile phone is a gadget usable for universal service and in the era of broadband the modeling has to be along these lines once all the underlying adoption issues are handled. From the same status it is clear that more male seem to argue that not everybody needs a mobile phone and this may be informed by the cultural formation of the society.

When formulating strategies to close the digital divide then the cultural issues have to be part of the plan if the access gap has to be closed. As already seen men earn more than the female and hence means of production and therefore these coupled with cultural issues makes it

impossible to close the adoption gap without addressing our core culture issues .For example diversity in culture i.e. pastoralists ,hunters define how policies have to be formulated.

5.8 Reasons for non adoption

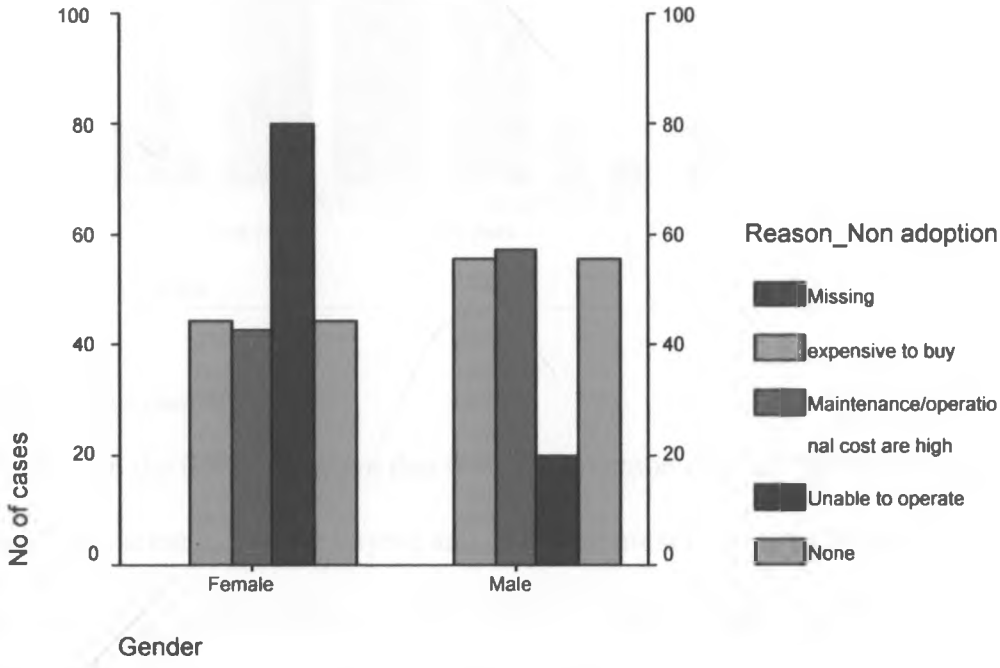

Figure 13: Reasons for non adoption

From statistics in 13, the highest hindrance to mobile phone adoption among the women was inability to operate the gadget whereas for the men it was maintenance costs, this looked at in the context of education and earning corroborate earlier finding along the gender basis. The gap will more often be skewed based on gender apart from other obvious socioeconomic factors and hence there has to be a deliberate effort to segment ICT reach based on gender to narrow the adoption gap to minimal levels. The inability to operate the gadget and cost issues related to maintenance fall into the category of socio economic and demographics factors that influence adoption.

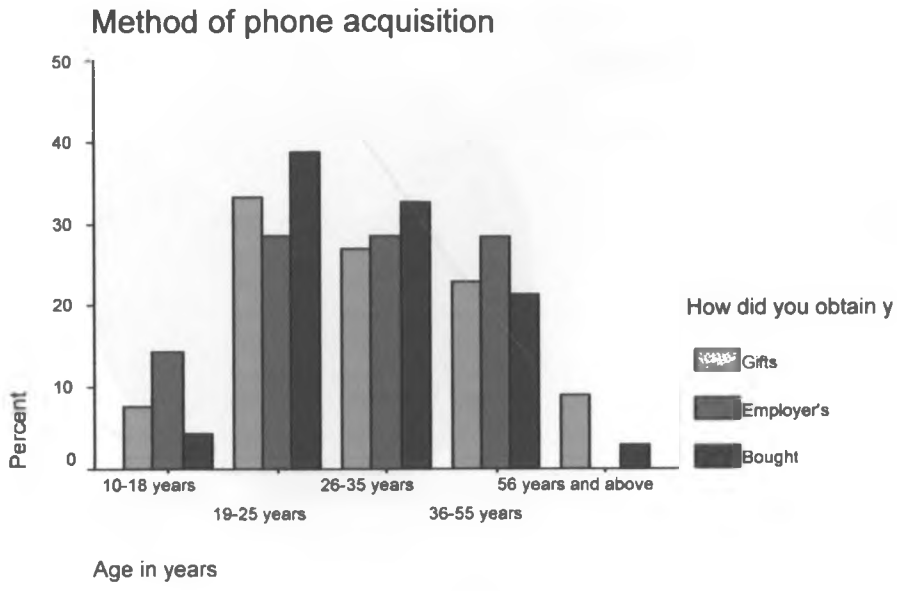

Figure 14: Mobile phone acquisition

It is clear from the figure 14 above that the most common means of phone acquisition among the rural population is through buying and gifts .But notably the percentages don't vary much in the age groups when it comes to gifts but it does vary critically when it comes to Employers and buying .As the groups advance in years no gifts or buying hence a bottle neck in adoption based on age. Gifts account for 25% of phone acquisition and lack of phones also at 20%.This cumulative puts the figure at 45% given that most of the people who receive phones via gifts are more likely to have difficulties with maintenance and this would account partly for the adoption gap.

The access of the phone has to be made cheap and so are the respective tariffs, if the same is adequately balanced with the right social economic policies then the universal gap is no longer an issue of access and technology .The requisite technologies are available only that the adoption model has to be well fitted into a framework that is cognizant of the varied differences in adoption.

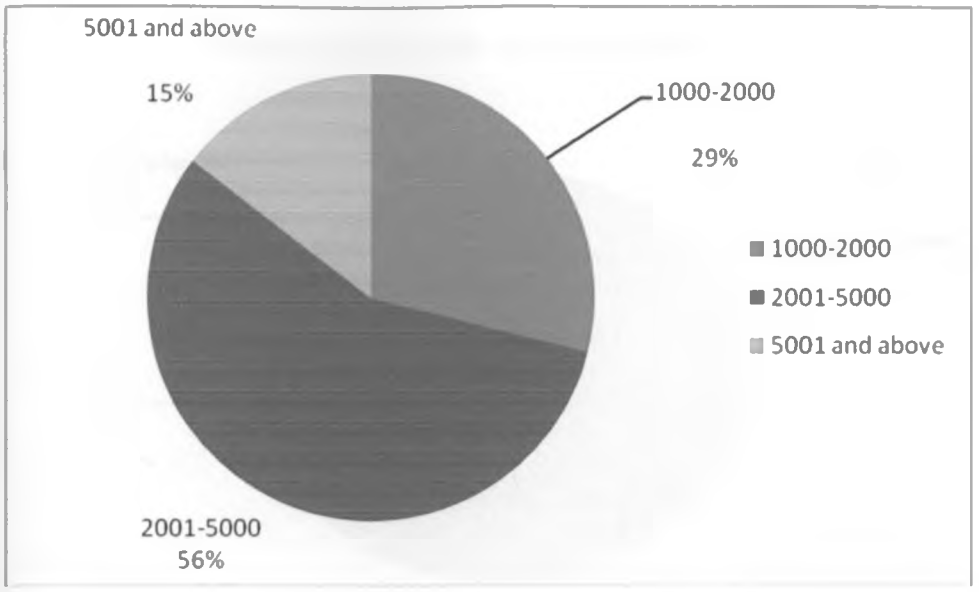

Figure 15: Capital cost for phone Acquisition

A whopping 56% of the respondents with phones acquired the phone at the price range between 2001-5000 and another 29% at the price of 1000-2000.It is clear that 90% of the people who acquired phones through buying acquired them at less than 5000 shilling which is equivalent to 6 dollars.

In the previous representation it was found out that 61%of the respondents earned less than 1.25 dollars per day which translates to 30 dollars per month .Simplistically put it does imply that 61% of the rural population spent 20% of their income in a single month to carry out a one off payment for mobile phone .This implies that on average the user has to save for a period of time or deny himself/herself basic needs to a acquire a mobile phone.

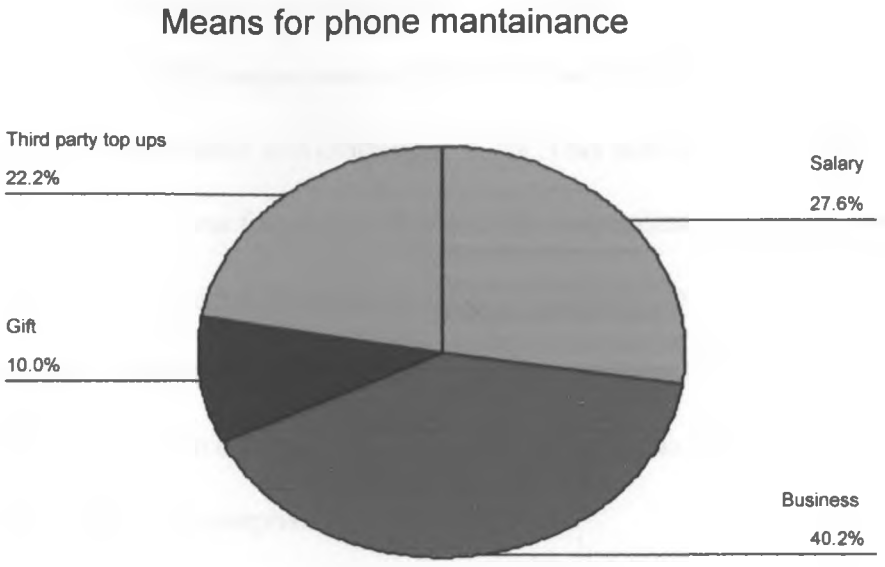

Figure 16: Phone maintenance

In figure 16 shows the bulk of money used for maintenance comes from either the small businesses or salary and this is at an accumulated figure of 67.8%, as already mentioned before this group spends an average of 12%-25% of their income on mobile maintenance, this figure is quite high but the comfort is that the money is raised by the persons themselves. The striking thing is how much the persons sacrifice in terms of primary needs to be able to cater for mobile phone maintenance

Table 5-3: Primary needs competing with mobile phone usage

		Frequency	Percent	Valid Percen	Cumulative Percent
Valid	Food	103	22.9	23.9	23.9
	Shelter	12	2.7	2.8	26.7
	Clothing	29	6.5	6.7	33.4
	Health & education	5	1.1	1.2	34.6
	Do not sacrifice	282	62.8	65.4	100.0
	Total	431	96.0	100.0	
Missing	System	18	4.0		
Total		449	100.0		

Table 5-3 illustrates the sacrifices some of the needs the mobile phone adopters have to set up for competition with maintenance of the phone as can be seen 23% of the adopters sacrifice on food,2.7% on shelter and clothing at 6.7% .This statistics tied with the finding under in table 5-1 where it was found that 39.4% of the respondents earned below Kshs 80 per day and can be easily concluded the same group of people sacrifice too much to have a phone ,some forego lunch after a day labor on farms which pays Kshs 80 per day and thus in the same amount they have to cater for airtime and charging of the phone among the many basic need that they need to accomplish .

Reviewing our objective of what is foregone in terms of needs to run mobile phone it is quite clear that food tops at 24% followed by clothing at 6.7%. It is right also to point out that 65% of the respondents do not sacrifice much in terms of their earning given that the top up as are provided by friends and relatives.

Perhaps further studies need to be done to ascertain some elements of technology adoption and assess; when does one conclusively say they have adopted a technology when some wholly depend on third parties to adopt mobile phones?

5.9 Cross tabulation; age and reasons for owning a mobile phone

Table 5-4: Cross tabulation reason for adoption Vs Age

		Age in years					Total
		10-18 years	19-25 years	26-35 years	36-55 years	56 years and above	
What is your main reason for owning and using a mobile phone?	Calling relatives and friends	15	96	68	62	11	252
	Business transactions	2	28	34	11	2	77
	Sending and receiving money		1	5			6
	Emergency situations	1	8	5	6	1	21
	Prestige	1	2	1			4
	Not Applicable	9	27	12	19	15	82
Total		28	162	125	98	29	442

The main reason for phone ownership as shown in table 5-3 is calling relatives and friends which would otherwise imply that more than sixty percent of the respondents across all age groups are social related issues and very little to do with economics, ecommerce, building business and so on .

In social aspect lies the key towards formulating a framework that is workable in achieving universal access. Business transaction and emergencies comes in closer range hence implying that to adequately formulate any policy then emergency mechanisms are important an important facet.

Do you sometimes forego any of your basic needs (food, shelter, and clothing, and health, education) to operate and maintain your phone?

Table 5-5: Do you forego anything to operate a phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	123	35.4	37.5	37.5
	No	150	43.2	45.7	83.2
	Not Applicable	55	15.9	16.8	100.0
	Total	328	94.5	100.0	
Missing	System	19	5.5		
Total		347	100.0		

From the statistics above it is quite clear that a sizeable number of people sacrifice basic needs to support having phones and this numbers are at 35.4% among all the interviewed population representing about 50% of the population with phones. This in essence means to access mobile phone is more of a burden to the population than anticipated.

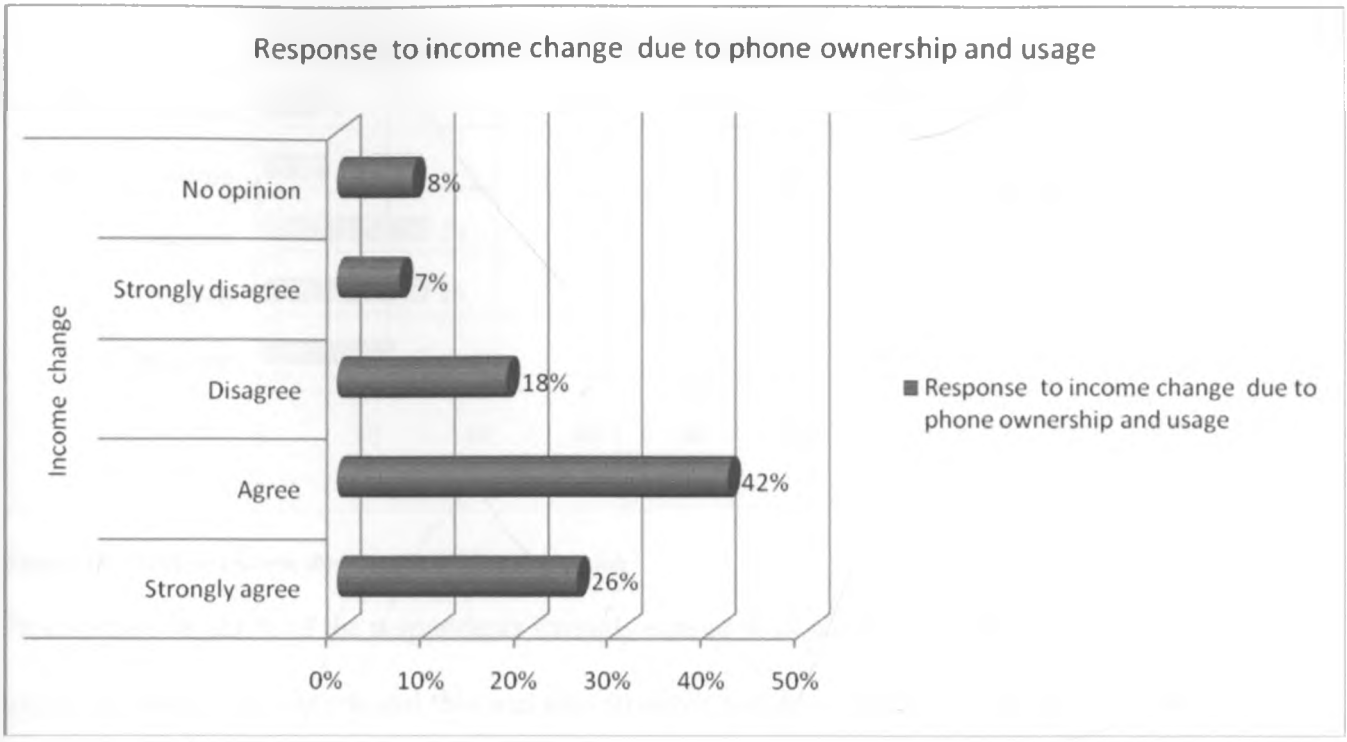

Figure 17: Income change due to mobile phone ownership (positive or negative)

As shown in Figure 17 most 26% of the respondents had the strongest perception that their income had considerable changed due to phone ownership and 42% agreed to the same question, this in essence meant that most of the respondents were aware that the phone was having strong impact in their socioeconomic life.

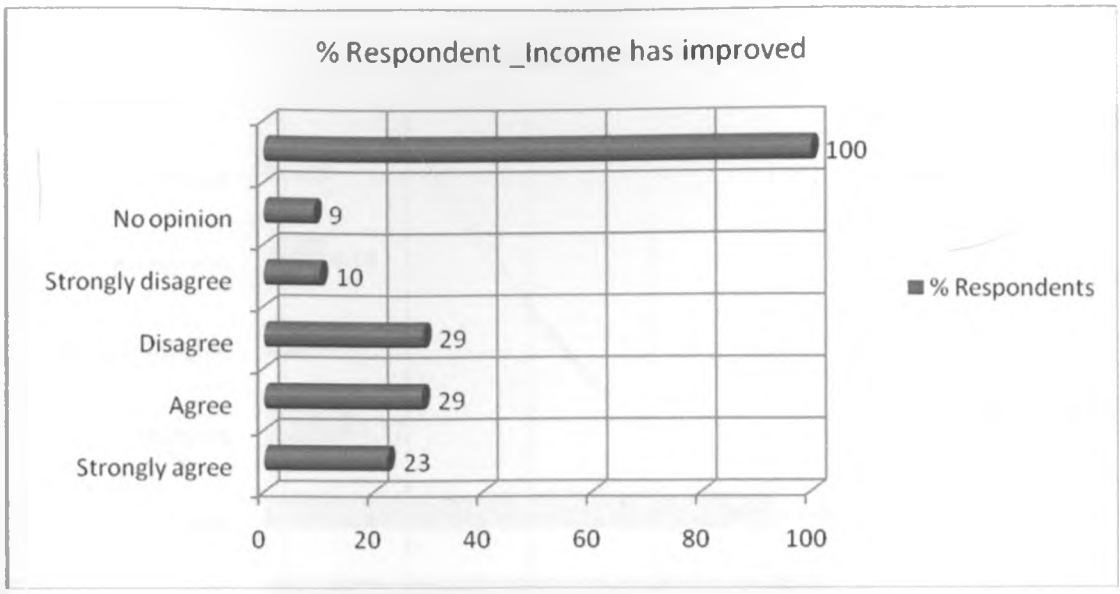

Figure 18: Positive income due to mobile phone adoption

From figure 18 ,23 % of the respondents strongly concur with phone adoption having greatly improved their daily income and this was also strongly noted among the people involved in the informal sector .To the informal sector the phone is an office unto itself given they are able to access their clients at a click of a button and to this group they can not do without the mobile phone .The number of respondents who alluded to the mobile phone changing their income in figure 17 was 68% whereas in figure 28 only 51% either strongly agrees or agrees to the phone having improved their income .It was evident by inference that 17% of the respondents either had no opinion or disagreed with this kind of conclusion .

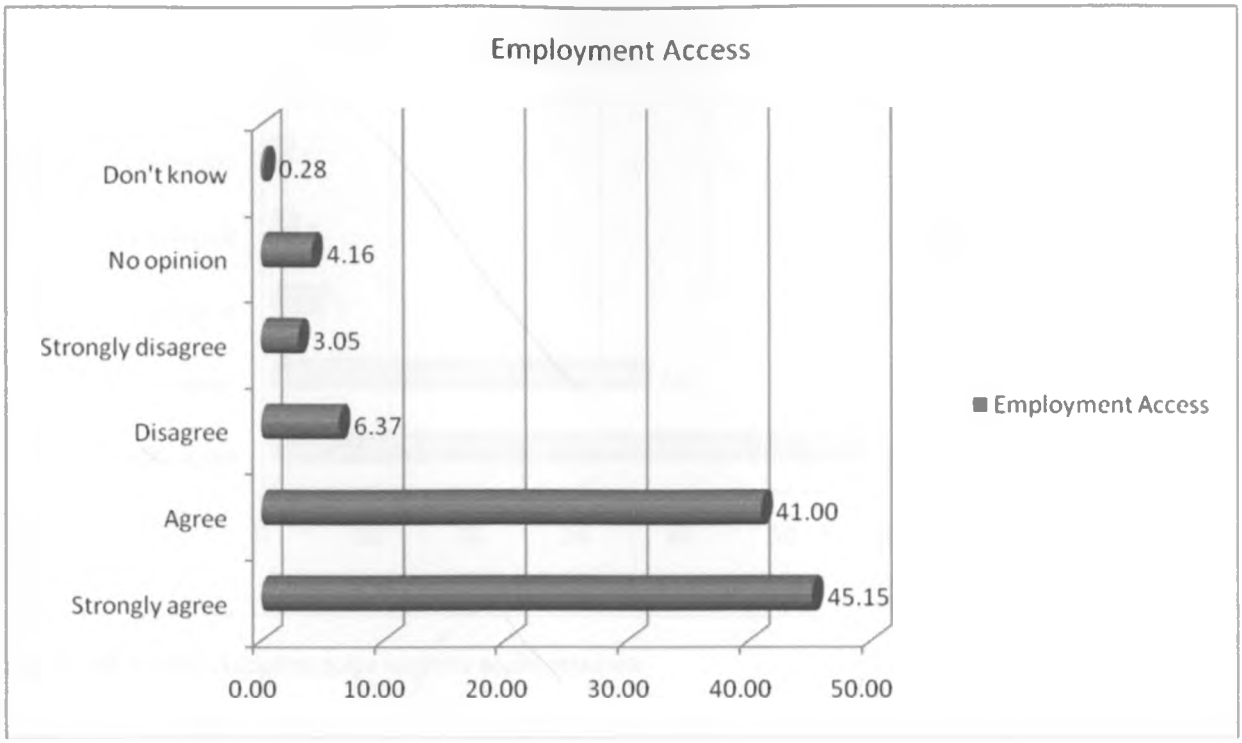

Figure 19: Mobile phone adoption enables rural people Access employment

Figure 19 shows a unanimous acceptance of 86% by the rural population in the believe that mobile phone helps people access employment .This statistic is of importance because it points towards one of the key areas of adoption of the phone i.e. if there is beneficial value in technology then adoption is much easier .Interestingly enough in figure 17 only 51% point to improvement in income due to mobile phone adoption, whereas in figure 19, 86% of the population believe that mobile helps people access employment , it could be interpreted that whereas there is the belief it was at variance either the income improved not necessarily by accessing a job but perhaps through borrowing and communicating with ones relatives.

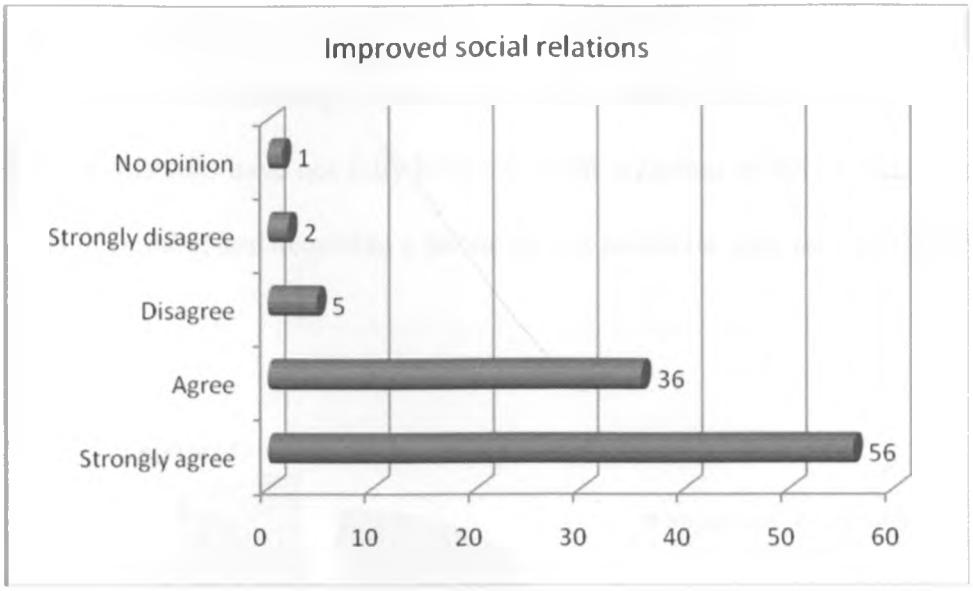

Figure 20: Mobile Adoption helps improve social relations

In figure 21 at 92 % is an agreed position that mobile phone improves relation .This figure can only be comparable to perception of mobile phones helping individual improve relations. With only 8% of the respondents responding negatively to this assertion .This finding points to the sentimental attachment of mobile phone users to their phones as a social tool

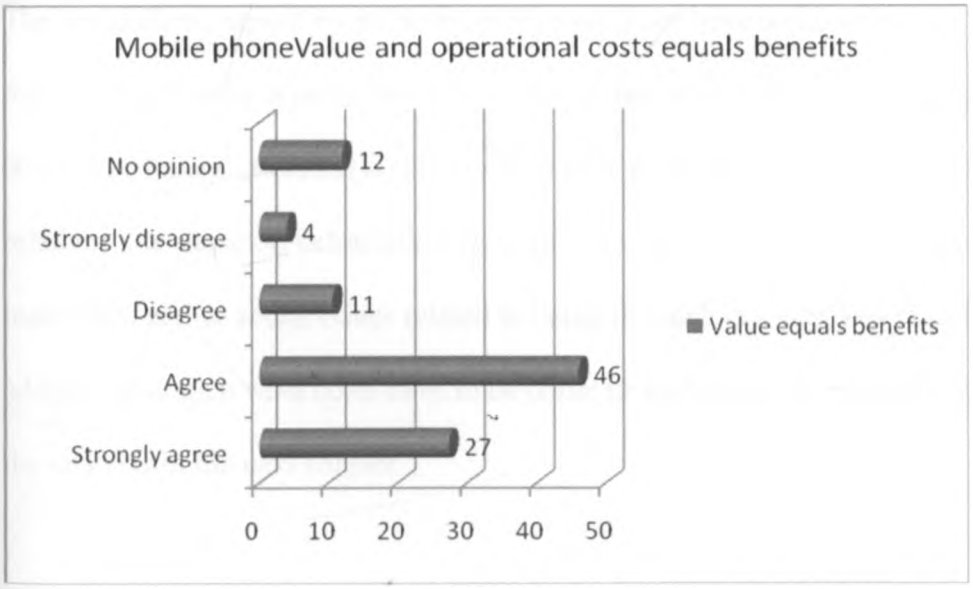

Figure 21: Mobile phone value vs. benefits

27% of the respondents and 46 % of the respondents strongly agree and agree on the benefits of mobile phones forming 73% of the adopters which basically means there is still a 27% of respondents who have not fully believed in the adoption of the mobile phone given that the costs of running and acquiring a phone do not reconcile with the benefits,

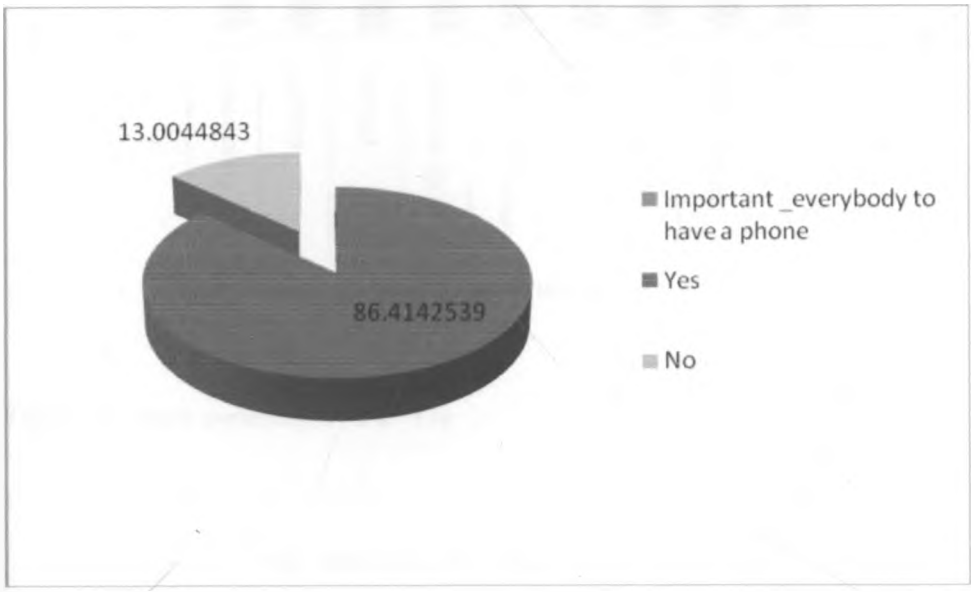

Figure 22: Must everybody have a phone

The respondents agreed by 86% that everybody must have a phone and the top three issues for everyone having a phone were identified as being for emergency purposes in case of issues like funeral ,sickness and this was at 18% as shown in figure 23.Maintanance of social relations and transport substitution were almost tied at 22% and 20 % respectively .As mentioned earlier social issues related to being in touch is a very key reason for mobile phone adoption ,but then what costs have to be borne to maintain such relations, this will be seen in the analysis in the next chapter .

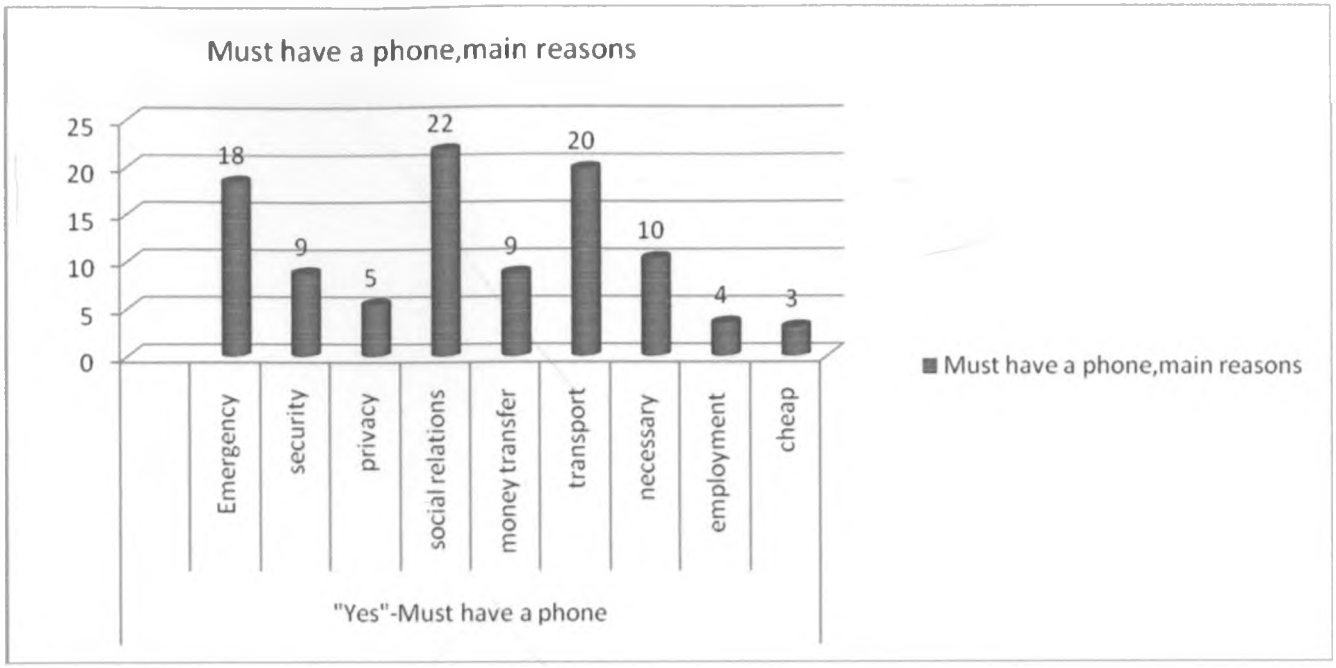

Figure 23: Phone ownership a must? Yes

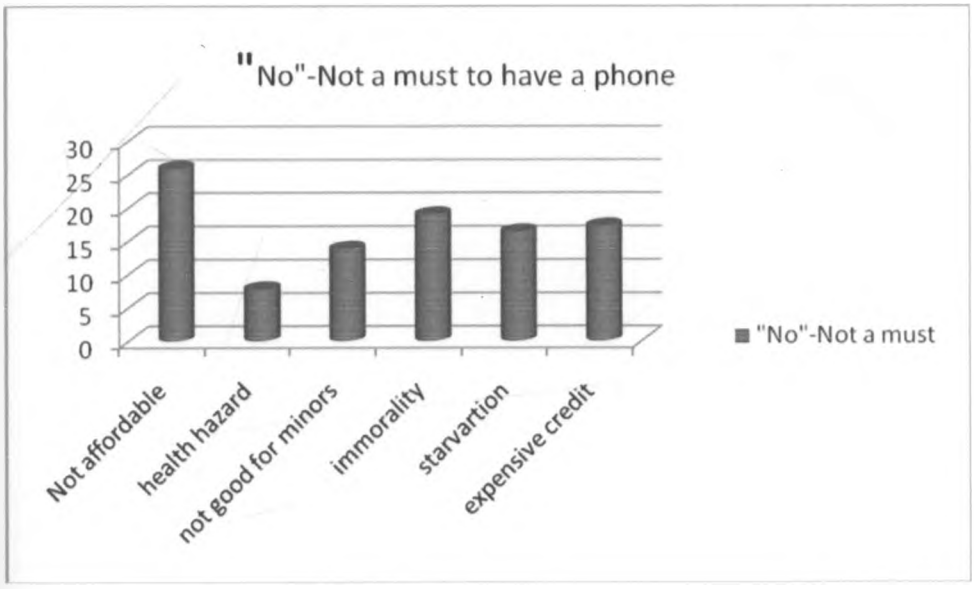

Figure 24: Not a must to have a phone

The key reason for the non adoption of the phone as highlighted in the findings above is the non affordability of the handset placed at 25% followed closely by immorality and expensive credit. It would be safe to suggest that from the above findings that the social cultural issues are just as important to the respondents as the tariff cost of the mobile calls, this does call for

strong oversight in terms of regulation of content that passes through the mobile phone as this seems to affect attitude and perceptions of the would be adopters.

6 Chapter 6: Discussions of the finding &Implications

ICT development is at the heart of Kenya's vision 2030 as it was identified as key driver and pillar of growth towards 2030 vision. In the time of economic downturn starting early 2009 Mobile phone industry in Kenya was the only sector growing and still recording high profits despite the fact that majority of the people live in the rural areas.

80% of Kenya's population lives in the rural areas and as such it is imperative to understand the adoption of levels of ICT and whether at the microeconomic level we are experiencing the same result as at the macroeconomic level. Our key focus for the research revolved around socio economic, demographic and personal factors in adoption of the mobile phone and how this was related to the affordability of mobile phone in terms of initial costs and running costs. It was also a chance to assess whether the regulatory regime is playing its role adequately on the technology demand side it does on the technology supply side. It is not contestable that at national level mobile phone does make impact in terms of economics but can the same be said of the users at the rural level.

The research was able to find out that in the rural set up the mobile phone has been adopted as the preferred method of communication, it could be argued out perhaps it is for lack of other means of communication .For all the persons that were interviewed 80% of them had a mobile phone or borrowed from somebody for purposes of communication .The details are a captured in figure 26, for a rural population where 58.5 % of the respondents earn less than us dollars 1.25 as shown in table 5-1 it is an observation that can be utilized as a lounge pad for rolling out other ICT services like broad band in the era where the industry buzz word has been fiber optics .

The traditional methods of communication are first being swept away by the phone with only paltry 3% using community phone and the letters at 2%.The statistics seem to suggest that most of the people prefer personalized services rather than sharing the means of communication ,this development brings to fore the issue of rollout of community based centers for shared facilities .The regulatory system is still currently setting up universal service funds for rollout of communal ICT service points , rather than adopt this kind of strategy it would be a better idea piloting services to the individual users at subsidized costs than set up centers in places that they can not be utilized .

Perhaps learning from this research when high speed broadband becomes available then a strategy towards personalized services even in the rural areas could hold the key to adoption.

6.1 Age in mobile phone adoption and use

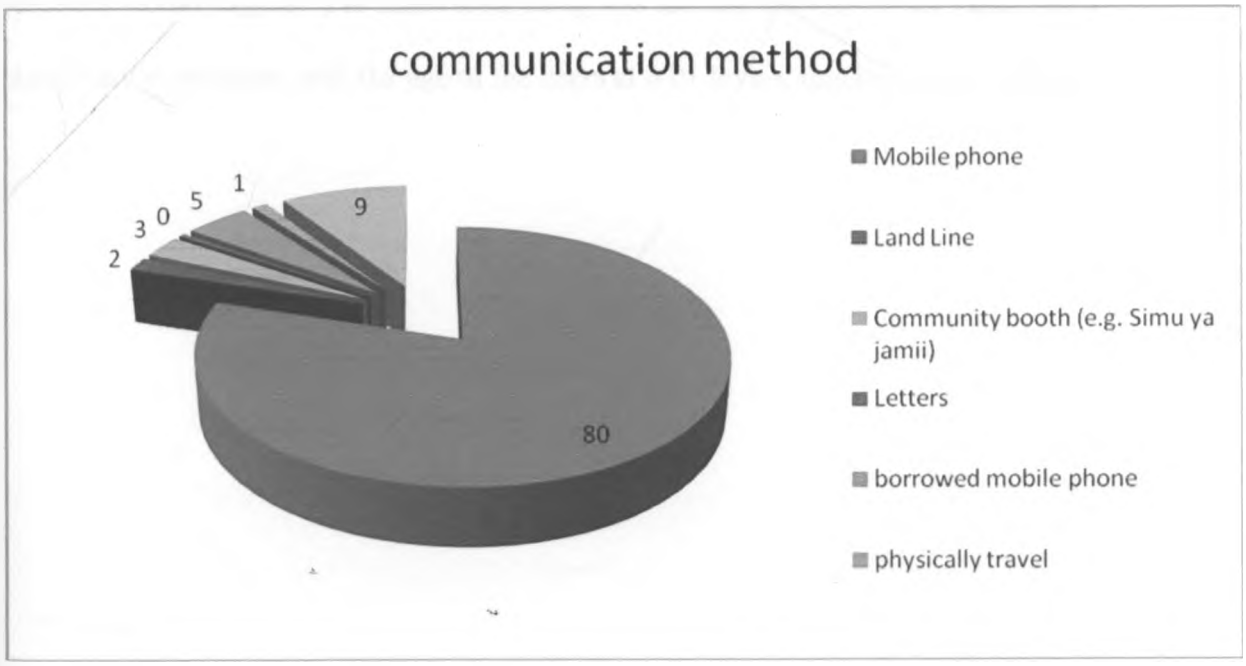

Figure 25: Method of communication

The trend of personalized service is well evidenced by the different age groups, whereas the old seem to have no issue with the old mode of communication, the young between the ages

19-35 make the bulk of the adopting group .This observation is well supported by various research that point to age being factor in adoption and this is covered in a model by Judy and Biljon (2008) called STAM, senior citizens technology adoption model. The old tend to be slower adopters of technology and this finding is a call to the policy makers and the players in the ICT sector that age is an important issue in formulating strategies for adoption and the same applies to the industry players perhaps it was time part of the profits were invested in giving the old incentives like cheap tariffs, phones that can only utilized within a certain geographical areas. With all the statistics the government has it would not be difficult to administer such an initiative.

We had also an interesting finding that 34% of the respondents had more than one sim card implying that the actual penetration numbers of the mobile phone are much lower than the statistics would suggest .The interesting thing was that the number of sim cards had a significant correlation with the age of the users at 0.01 levels, this is shown in table 6-1

Table 6-1: Correlation Age vs. sim cards

		Age in years	How many mobile phone sim cards do you have/own?
Age in years	Pearson Correlation	1	**.150**
	Sig. (2-tailed)	.	.001
	N	448	448
How many mobile phone sim cards do you have/own?	Pearson Correlation	**.150**	1
	Sig. (2-tailed)	.001	.
	N	448	448

** Correlation is significant at the 0.01 level (2-tailed).

Reviewing the finding in Table 5-3 t was established that most of the mobile phone adopters use the phone for maintaining social relations i.e. calling friends and relatives and this finding is consistent with research contacted by other researchers.

Age is really differentiator of mobile phone adoption and usage, this was demonstrated by the different bivariate correlation it had with some of the variable under investigation. For example this was found consistent with method of mobile acquisition, reason for adoption and most of the perception questions on mobile phone benefits v correlated with age.

The very young age,10-18 and old ,age 56 and above do acquire phones through gifts and few buy their own but the age group between 26-35 buy phones and their uses are varied i.e. business ,SMS whereas for the very old as already seen use phones for emergency and receiving money or communicating to relatives. The Pearson correlation was both at the 0.01 and 0.05 level as shown in figure 27.

6.2 Correlation: Gender, Age, education vs. other variable

The table below clearly illustrates some of the key finding of this research which have been corroborated by other researchers and specifically the below

Age came out clearly as an element that has significant correlation with all other constructs that would influence adoption

Table 6-2: correlation vs. other variables, Pearson correlation

Correlations

		Age in years	How many mobile phone sim cards do you have/own?	What do you use for communication?
Age in years	Pearson Correlation	1	.150**	-.052
	Sig. (2-tailed)	.	.001	.269
	N	448	448	448
How many mobile phone sim cards do you have/own?	Pearson Correlation	.150**	1	.589**
	Sig. (2-tailed)	.001	.	.000
	N	448	448	448
What do you use for communication?	Pearson Correlation	-.052	.589**	1
	Sig. (2-tailed)	.269	.000	.
	N	448	448	448

**. Correlation is significant at the 0.01 level (2-tailed).

Age as shown has a significant positive correlation with the number of sim cards at .150 and it would suggest that age is a key consideration when looking at issues related to penetration.

Looking at gender, as many studies already suggested it does not play a critical role in adoption and one would suppose that on keen looking, gender is yet to be a player in the area of adoption as one would otherwise imagine

6.3 Other demographic factors

The other issues like marital status and gender did not seem to play a significant role in mobile phone adoption and usage .However it was noted that the no of sim cards or effectively no of lines was positively correlated with marital status .The married persons have a high chance of having more than one line and this was explained by the social lifestyles the people exhibited ,implying that that when the national statistics are being done on mobile phone penetration this figures are likely to be overstated considering that they are based on the actual number of sim card sold by the operators .

This statistic is very important to the policy makers in trying to come up with an effective way of measuring the national mobile phone penetration .The gender aspect did not seem to play a very significant role in terms of correlation with any of the other variables. Marital status as shown in table 6-2.By conclusion it suffices that gender is not a significant variable when considering adoption in the rural areas

Table 6-3: Correlation, gender vs. no of lines

Correlations

		Marital status	How many mobile phone sim cards do you have/own?
Marital status	Pearson Correlation	1	.111**
	Sig. (1-tailed)	.	.009
	N	448	448
How many mobile phone sim cards do you have/own?	Pearson Correlation	.111**	1
	Sig. (1-tailed)	.009	.
	N	448	448

**. Correlation is significant at the 0.01 level (1-tailed).

6.4 Social economic factors

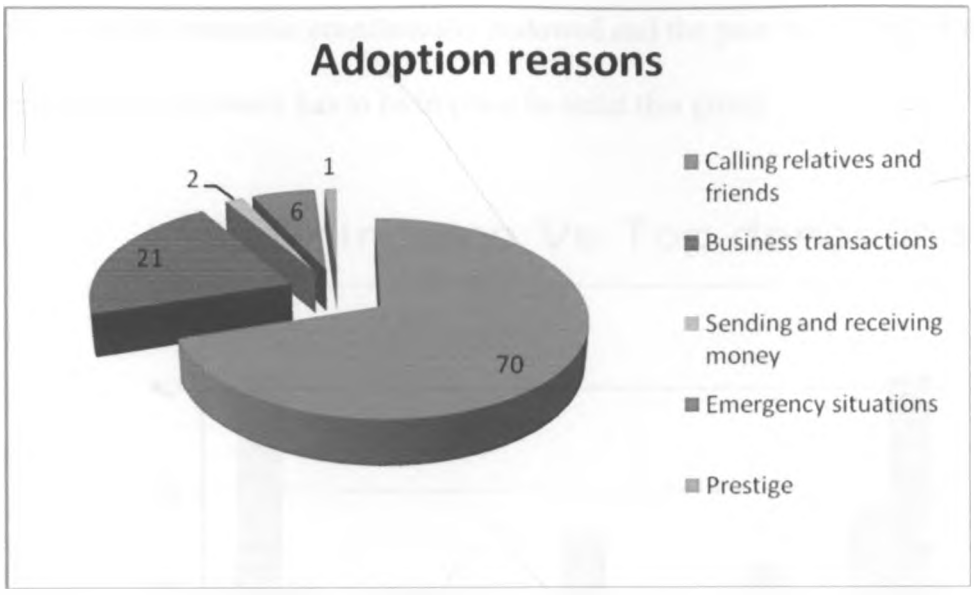

Figure 26: Reason for adoption

70% of the respondents attributed phone adoption to maintaining friends and relatives and looked at in the context of cited research, for the emerging markets cultural issues are at the centre of mobile phone adoption as shown by this statistics .Business transaction came in second with 21% of the population but interestingly enough some considered a phone as an investment i.e. they could borrow money using the phone as collateral at the local level. Value added services by the mobile phone providers seem also to drive adoption with services like MPesa and Zap.

The mobile phone was also seen in the light of emergency services and hence all this are areas that need proper regulatory platform to address the interplay between giving the same service to the rural poor and the urban population. It was found out that the rural people have acquired education up to the secondary school level and hence limited in terms of education ,therefore consumer sensitization is very important if all the services that are provided by the licensed operators were to be utilized with the core business being to offers services to the adopters. It was also found out that education was significantly correlated to income and

hence, the real value of adopting may as well not be realized because in terms of utilization the wedge between the economically endowed and the poor seem to grow therefore proper regulatory framework has to be in place to assist this group

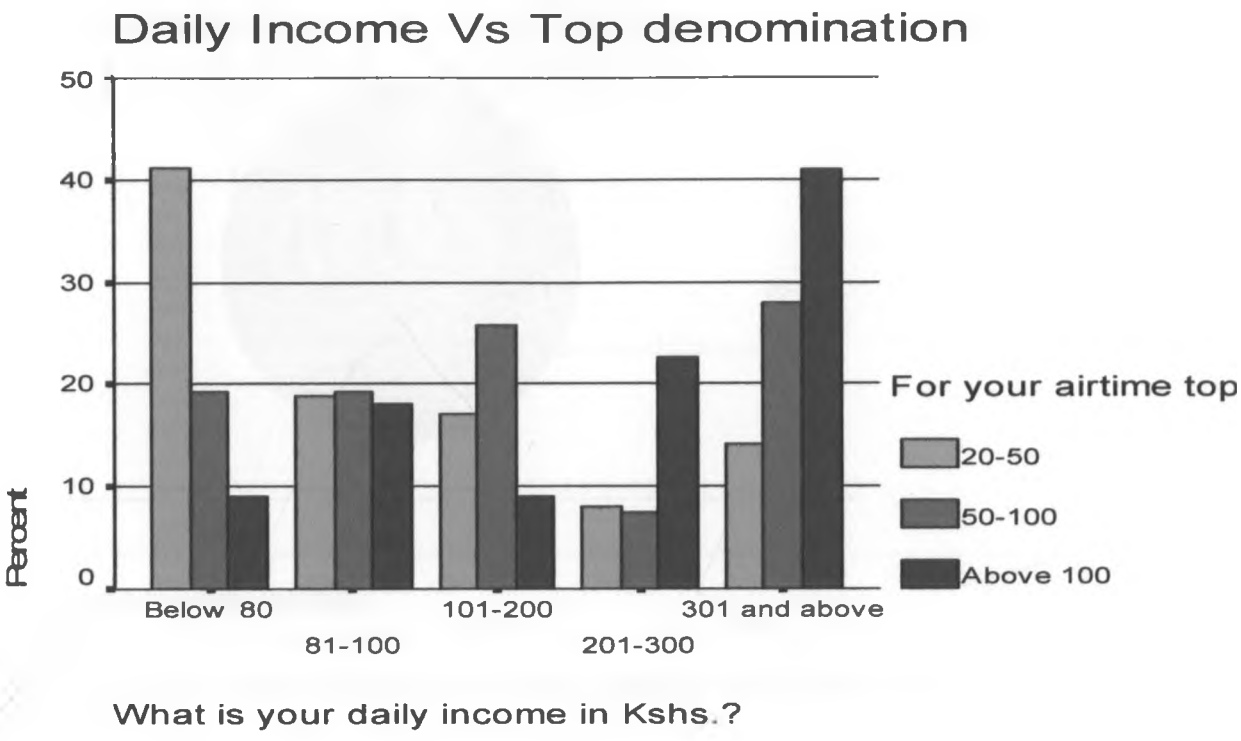

Figure 27: Income and Top up denomination

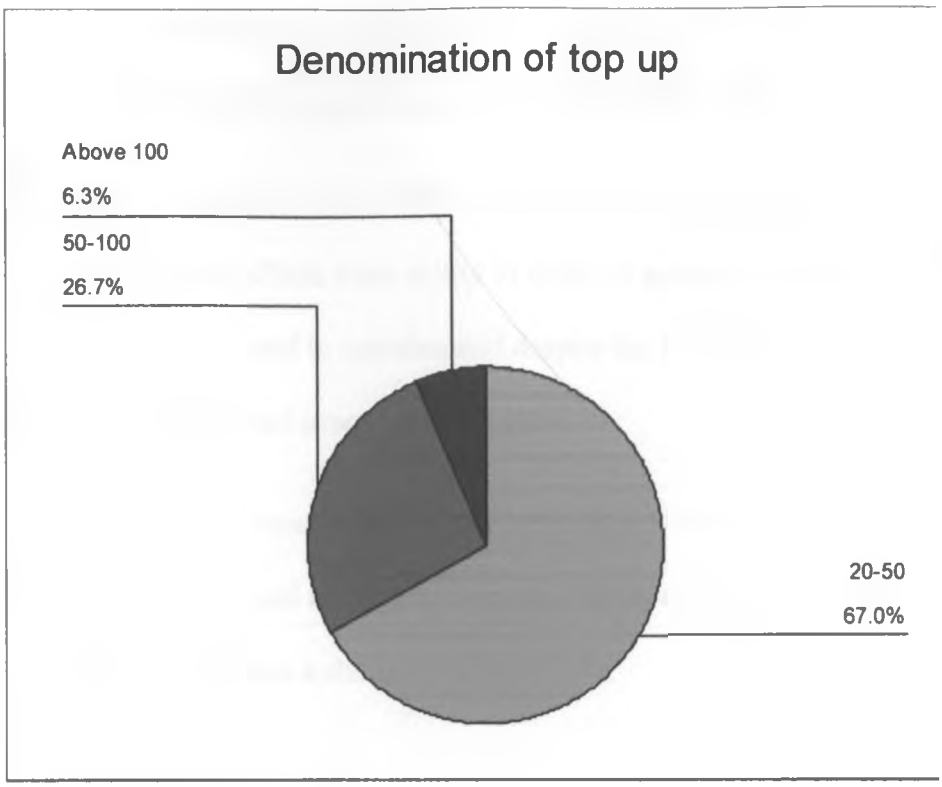

Figure 28: Scratch card denomination

From figure 29 it was evident that the persons who earn below 80 the preferred denomination for loading airtime were the 20-50 shillings scratch card and this accounted for 67% of the reloads. The main reason for this reload type was because it was assumed to be cheap and thus affordable .On average this group loaded airtime three time a week implying at minimum they spent Ksh 240 per month on air time alone and putting this into perspective it does represent a minimum of 10% of monthly earnings on mobile phone airtime without considering other factors like travelling to the nearest shopping centre for charging and this is the cost for maintaining social relation for the low income earners .

This figure could go as far as 25% assuming that the 50 shilling denomination was being used .This denomination is used at the level of only 30% of the respondents ,assuming that the scratch card in use was for a 100 shillings, this group spends more on communication than the lowest of the BOP. On average the low income groups spent between 10%-25% of there

income on mobile phone communication and this is still much higher than the thresholds in the developed world where this needs to be below 5% of the disposal income.

Education was another element that was able to correlate widely with other variables .It is a fact the education affects ones ability in terms of getting a job and earnings and even in the rural areas this seemed to corroborated despite the fact that education at this level is primarily primary education and secondary education.

Interestingly to the most of the people interviewed it did not come out clearly the correlation between education and earning and perhaps this is explained by virtue that most of the people were earning less than Kshs 200 per day

6.5 Regulatory factors

From the discussions in other section it has come out clearly that there is required a strong regulatory oversight in addressing issues in the rural areas among the poor. Access in terms of geographical coverage is not an issue in the era of mobile phone as this is handled by technology. The biggest dilemma is now employing technology in addressing affordability factors.

Education and age issues came out strongly as areas that require the regulator to consider including in the model, development for addressing adoption and usage .The educated people are aware of the services offered by the industry and given the rural areas have a high number of people without attaining high standards of education, then alternative methods have to be devised to bridge this gap.

Given this study did not find a strong correlation related to gender issues it may be an area to look at in terms of adoption due to the high number of women that were found to be in the bracket of single or widowhood but it was clear in terms of carrying out assessment for

mobile phone penetration it was not enough to just use numbers from the operators but rather crunch this numbers using statistical methods with national statistics to give a clear indication of the actual users of the mobile phones.

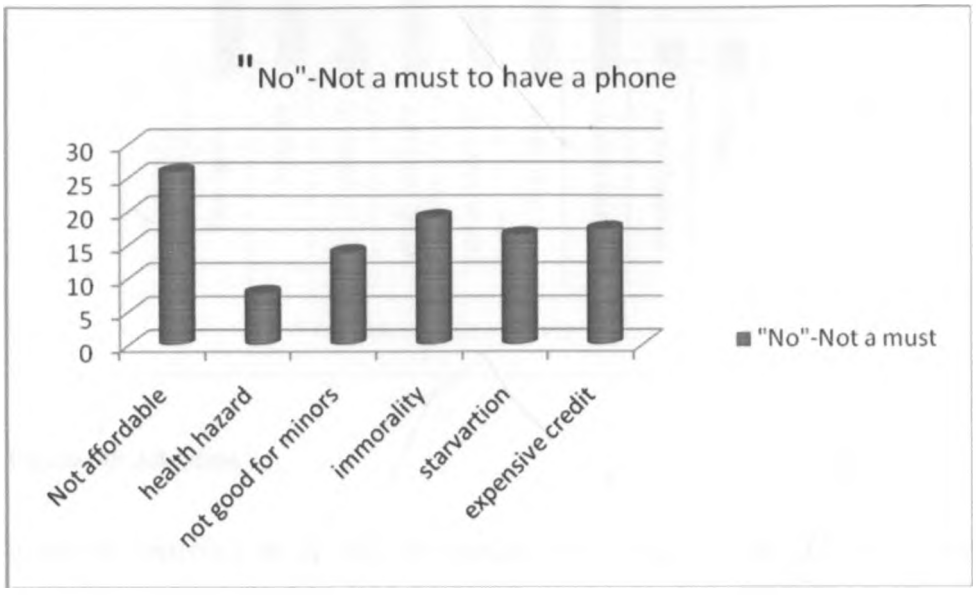

Figure 29: Non Adoption

The non adopters in our research was less than 20% but the areas that are a hindrance ,it was clearly shown as in figure 30 that handset affordability and credit were the main issues of concern at 25% and 15% respectively .This calls for a shift from the overemphasize of the regulator addressing mostly the technology supply side issues as opposed to the demand side ,perhaps a more focused approach toward the poor would bear fruit considering that statistics from the operators point to this areas contributing the highest revenue .As already discussed this is at the cost of about 20%of income available to the rural population .From the statistics it is becoming clear that health issue and issues related to children are popping up and the sooner the regulator shift gear and set the pace it would be too late to come in ,the gains made on the access front could be eroded by the suspicions of the non adopter

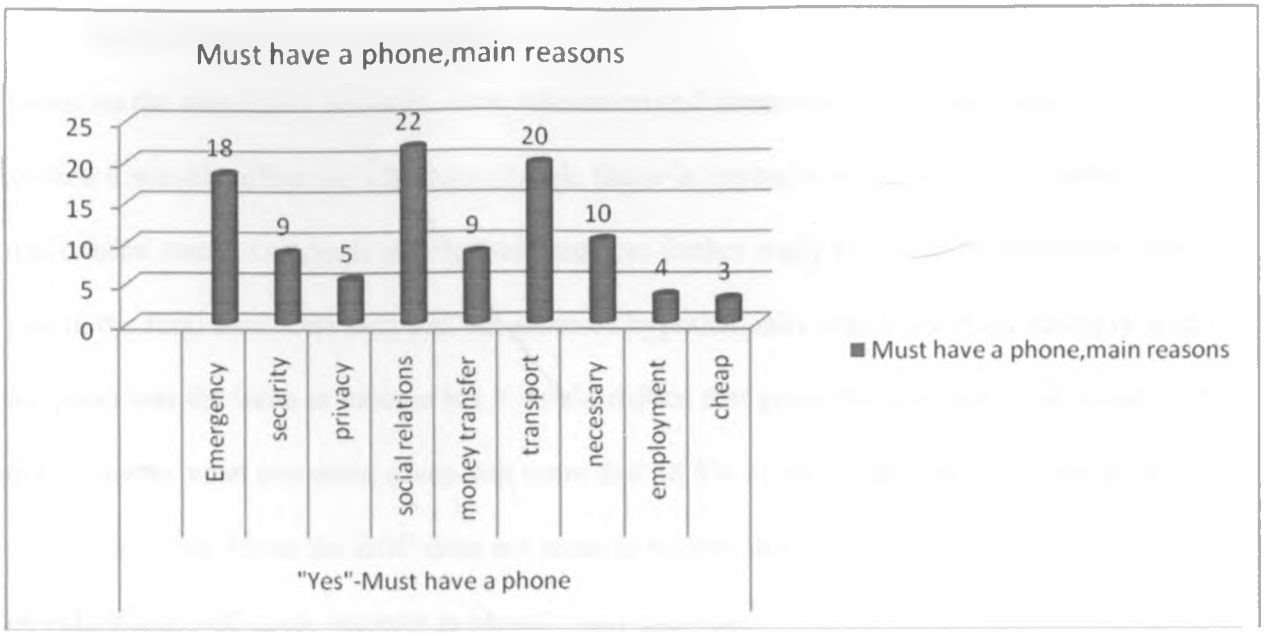

Figure 30: Adoption

From the statistics on the why the people feel everybody should have a mobile phone ,the key issues are social relations, transport substitution and emergency .interestingly 10% suggest the mobile phone is a must have gadget and this group could be said that they have fully adopted mobile phone.

Emergency incorporation in any future technology would push the numbers in adoption, technologies like VOIP have not picked up due to the uncertainty of the same being linked up to institutions like police and this implies real issues that push adoption are primarily social and the business dimension could be referred in this case as mobile phone adoption dividends .A case in mind is the MPesa service that began as a customer retention strategy and currently it is one of the top selling points of one of the operator in the cellular industry .

6.6 Refined model based on analysis

Based on the correlation analysis, cross tabulation and interpretations given in the previous section it would suffice the key demographic factor is region in this case rural or urban, age and marital status. Gender is an issue that requires further study to ascertain whether it plays part in the rural area. One area that we assumed hypothetically was to correlate strongly with adoption was the issue of income but it would suffice that given the area was rural in nature it did no matter what one earns given that more that 58.5% of the people earn less than Kshs 200 per day and this at the BOP does not seem to matter, this can only matter when dynamics of individuals with high incomes is brought into question.

On the social economic front the critical factor was the level of education ,education dictated things like the number of lines ,denomination of recharge among other variants .It is incumbent upon the regulatory regime to seriously look at investing in education either formal or through sensitization mechanism to bridge the adoption divide and phone usage models. The regulatory issues that require address are various and all need to be addressed in any model but this will keep expanding

7 Chapter 7: Conclusions and Recommendations

From the study it would suffice that total adoption of mobile phone among the low income earners has dynamics that go beyond the proposed model by Judy et al .Interventionist regulatory incentives both on the technology supply and demand side are requisite in achieving adoption.

The intervention mechanism to spur adoption would call for much targeted efforts that are aimed at catering for the individual because adoption is at the core of universal service. Universal service as mentioned previously has traditionally been defined by three features, Access, Availability and Affordability .The first two items have been demystified with mobile technology but affordability still looms as a challenge .The model proposed goes beyond addressing individuals socio economic issues to policy mechanisms that are able to handle Access Gaps. Some of the areas that have been researched that bear an implication on closing the gap are Mobile phone handset cost, Tariff plan ,quality of the network, community phone

The growth in ICT experienced at the macro economic level can only be reflected among the low income earners on a microeconomic level if an effort is made in understanding the specific needs of the people and including it in the framework for adoption so that both the demand side and the supply side are all catered .This approach is already being witnessed in the area of tariff where one of the mobile operator is piloting differential pricing. If indeed the cells that recorded no traffic with differential pricing the traffic goes up then it is an admission that the problem lies in the affordability of the prices being offered by the players in the telecommunication sector in Kenya.

Noting these difficulties the government of Kenya has zero rated duty on phones and one would argue that rather than piece meal adoption of different findings of various researches it

would be worth redrawing the whole universal service policy framework to contain all the issues mentioned in the research and the implementation would be wholesome as opposed to piecemeal implementation being carried by operators whose underlying issues is profiteering.

Another focus area would be creating the right regulatory environment that would call for differential pricing of calls from the urban centers to rural area

In the view of the findings of the study the researcher recommends further research on the below areas.

The cultural dimension in the role of gender in technology adoption in rural areas

For rural communities in Kenya is there a distinct difference between Adoption and Acceptance in view of the fact that this research points to more than 35% ownership of phone through gifts from friends and relatives

Are the current phone utilization features worth the effort of RND by the big manufactures when the primary tool for the phone is sms and calls?

What mechanisms are available besides universal service fund in bridging the digital divide and increasing mobile phone adoption among the rural?

8 Chapter 8: References

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9 Appendix

9.1 Appendix A: Draft questionnaire for the pilot survey

Research questionnaire for an MSC (IS) UON | 2009

Research Tool: Questionnaire

Instructions

Please note that the questions are purely meant for academic purposes only

Any information given will be handled with a lot of confidentiality

Tick in the blank box provided (√) or insert your response in the space provided (----------)

Questions are in two parts

Part I deals with personal information

Part II deals with the research subject

Information provision is purely on voluntary basis

Part 1

Name (Optional) ----------

1. Gender: male ☐ Female ☐

2. Age in years

Below 18 years ☐ 19-25 years ☐ 26-35 Years ☐

36-55 years ☐ 56 Years and above ☐

3. Marital status

Married ☐ Divorced/Separated ☐ Single ☐ Widowed ☐

4. What Level of education have you attained?

Primary ☐ Secondary ☐ College ☐ University ☐

Others, specify ----------

Part 2

5. What is your employment status?

Self employed ☐ Casual Employment ☐ Permanent Employment ☐

Peasant farmers ☐ Unemployed ☐

6. What is your income per month in Kshs?

Below 3500 ☐ 3600-6000 ☐ 7000-10000 ☐ 10000 and above ☐

7. Do you own a mobile phone?

Yes ☐ No ☐

i) If the answer in 7 is yes then proceed to question 8
ii) If answer is no ,state why you don't have a phone

Expensive to buy ☐ Maintenance /operational cost are high ☐

Unable to operate ☐ others, specify ----------

8. How did you obtain your mobile phone?

Gift ☐ Employer's ☐ Bought ☐

Other Specify ----------
i) If bought how much did the phone cost you in Ksh ----------

9. What is your main reason of having a mobile phone?

Calling relatives and friends ☐ Business transactions ☐

Sending and receiving money ☐ Emergency situations ☐ Prestige ☐

Others, specify ----------

9. Do you regularly load airtime on your phone?

Yes ☐ No ☐

i) If yes how many times per week----------
ii) How much do you spent averagely per week on maintaining the phone (charging ,airtime)---

10. Do you forego any of your basic needs to operate a phone? (Food, shelter, sanitation, clothing, education)

Yes ☐ No ☐

i) If yes proceed which item have you most sacrificed for the sake of mobile phone?

Food ☐ Education ☐ Health ☐ Other Specify ----------

ii) If No, in order of priority how do you fund your phone maintenance

11. Mobile phone ownership improves my economic status

Strong agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

12. Cost of running mobile phone is comparable to the economic/social benefits

Strong agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

13. In your opinion must everyone own a mobile phone?

Yes ☐ No ☐ other specify ----------

14 If the answer is no above, what in your opinion should be put in place to afford mobile phone services

15. What would you like to see change in the ICT sector to make the mobile phone your choice tool of communication?

Reduce cost of mobile ownership ☐

Reduce calling rates ☐

Setup community phones ☐

Other, Specify ----------

9.2 Appendix B: Field Questionnaire for the pilot survey

Research questionnaire for an MSC (IS) UON Mobile phone adoption in rural areas	2009

Research Tool: Questionnaire

Instructions

Please note that the questions are purely meant for academic purposes only

Any information given will be handled with a lot of confidentiality

Tick in the blank box provided (√) or insert your response in the space provided (----------)

Questions are in two parts

Part I deals with personal information

Part II deals with the research subject

Information provision is purely on voluntary basis

Part 1

Name (Optional) ----------

Area(location)----------

Current residence : Urban ☐ Rural ☐

1. Gender: male ☐ ale ☐

2. Age in years

10-18 years ☐ 19-25 years ☐ 26-35 Years ☐

36-55 years ☐ 56 Years and above ☐

3. Marital status

Married ☐ Single ☐ dow/Widower ☐

4. What Level of education have you attained?

Primary ☐ Secondary ☐ College ☐ University ☐

Specify any other training attained (Women group, youth group etc)----------

Part 2

Student: Muhalia Allan P56/70270/07
Supervisor: Mr. Chepken

5. What is your employment status?

Self employed ☐ Casual Employment ☐ ermanent Employment ☐

Unemployed ☐ Contractual ☐

6. What is your daily income in Kshs?

Below 80 ☐ 81-100 ☐ 101-200 ☐ 201-300 ☐

301 and above ☐

7. What do you use for communication?

Mobile phone ☐ Land line ☐ Community Booth(e.g.Simu ya Jamii) ☐

Internet ☐ Others, Specify ----------

(If the answer in question above includes mobile phone proceed to question 8)
If not ,then specify reason for non adoption of mobile phone and respond to questions 26&27

Expensive to buy ☐ Maintenance /operational cost are high ☐

Unable to operate ☐ rs, specify ----------

8. How many mobile phone sim cards do you have /own?

One ☐ More than one ☐

(If answer above is "one" proceed to question 9)
If not, are the sim cards(lines) from one operator or different operators?

One operator ☐ Different Operators ☐

Give reasons for your answer----------

---

9. How did you obtain your mobile phone?

Gifts ☐ Employer's ☐ Bought ☐

Other Specify ----------

II) If bought how much did the phone cost you in Ksh?

1000-2000 ☐ 2001-5000 ☐ 5001 and above ☐

10. What is your main reason of owning and using a mobile phone?

Calling relatives and friends ☐ Business transactions ☐

Sending and receiving money ☐ nergency situations ☐ Prestige ☐

Others, specify ----------

11. In using your mobile in the above, what among the below best describes your frequent use of your phone?

SMS ☐ Call ☐ SMS and Call ☐ Receive only ☐

12. Identify from the below choices what best describes the reason for your choice in 11 above

Cost ☐ Easy of use ☐ lity of communication ☐ Content ☐

13. Do you carry out direct top up of airtime on your phone?

Yes ☐ No ☐

i) If yes how many times per week----------
ii) If No ,how do you top up----------

14. For your airtime top up, which denomination (kshs) of top up do you use most of the time?

20-50 ☐ 50-100 ☐ Above 100 ☐

15. Why the choice of denomination for topping up?

Available in the local shop ☐ heap/Affordable ☐ ☐

Specify, any other reason ----------

16. In the course of a single communication, have you encountered a situation where you have been required to carry out multiple airtime top up?

Yes ☐ No ☐

Give reasons for your answer----------

17. What is the source of income for your phone maintenance (airtime, charging etc)?

Salary ☐ Business ☐ ift ☐

Third party top ups(Friends & Relatives) ☐

Other, specify----------

18. Do you sometimes forego any of your basic needs (Food, Shelter, and clothing, Health, Education) to operate and maintain a phone?

Yes ☐ No ☐

i) If yes, which item have you most sacrificed for the sake of mobile phone?
ii) If no proceed to question 19

Food ☐ Shelter ☐ Clothing ☐

Health &Education ☐

Other Specify ----------

19 Are there instances when you have had to use a phone for communicating an important issue and still had to physically travel to convey the same message?

Yes ☐ No ☐

Give reasons for your answer----------

20.Do you agree with this statement " Mobile phone ownership and usage has reduced my transport costs "

Strongly agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

21.Do you agree with this statement "My income has changed since I started owning and using my mobile phone "

Strong agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

22.Do you agree with this statement "The mobile phone has improved my daily income "

Strongly agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

23.Do you agree with this statement "The mobile phone has helped me improve my social relations with friends and relatives"

Strongly agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

24. Do you agree with this statement "The cost of running mobile phone is comparable to the hidden benefits derived from ownership and operating of a phone "

Strongly agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

25.Do you agree with this statement "The mobile phone has enabled the rural people access employment which would not be possible without the phone "

Strong agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

No opinion ☐

26. In your opinion is it important for everyone to own a mobile phone? Give reasons for your answer

Yes ☐ No ☐ other specify ----------

I) ----------
II) ----------
III) ----------

27. In order of importance on a scale of 1-5; 1 being the most important and 5 being the least important .What would you like to see change in the information and communications technology (ICT) sector to make the mobile phone your choice tool of communication?

Reduce cost of mobile ownership ☐

Reduce calling rates ☐

Setup community phones ☐

Increase network coverage for the operators ☐

Improve network quality ☐

Other, Specify ----------

Interviewer (Name)----------sign ----------Date/Time----------

Field supervisor (Name)----------sign----------