BRIDGING DIGITAL DIVIDE IN KENYA USING ACCESS-INVOLVEMENT-INTERACTION POLICY MODEL EMPIRICAL EXPLORATION OF NAIROBI AND ENVIRONS

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2011

Bridging Digital Divide in Kenya Using Access-Involvement-Interaction Policy Model

Empirical Exploration of Nairobi and Environs

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A thesis submitted in partial fulfillment for the degree of Master of Science in ICT Policy and Regulation in the Jomo Kenyatta University of Agriculture and Technology

2011

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

To my parents, sisters and brothers who pushed and who pulled me in this pursuit. In the classical phrase of mother Theresa regarding her charity center in Calcutta, India “...it might be a rain drop, but if it wasn't there, it would be missing."

ACKNOWLEDGEMENTS

Inaccuracies, if any, in this research are my own, many have made substantial contributions to this work and I take pleasure to mention them here.

Foremost, glory to God, the Master of all Technology and Philosophy, without whom I, definitely, would not have completed this work.

For the lucidity that the research enjoys, express thanks go to Dr. Maurice Sakwa and Dr. John Kihoro who accepted to supervise this work. Besides their sensitive understanding of socio-cultural facets of technology, they spent untold hours reviewing the work, suggesting improvements and taking the risk of bringing me back to a taste of analytical statistics at another difficult stage of my career.

In addition, Dr. Panayiota Tsatsou of University of Wales, UK deserves recognition for her useful comments at the concept of this research. For readers to concentrate on ideas with little misunderstanding that a second language can create, credit goes to my wife, Ruth for her conscientious attention to misplaced modifiers, arbitrary spelling and eccentric punctuations.

Lastly, apologies are due to many others who have substantially influenced my thinking process for the good and whose thoughtful questions over the course of this academic experience challenged my traditional way of thinking. Their absence from the roll is more likely attributable to a failing memory rather than anything else.

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LIST OF ABBREVIATIONS

AII	Access-Involvement-Interaction
ANOVA	Analysis of variances
BPO	Business Process Outsourcing
CBS	Central Bureau of Statistics
CCK	Communication Commission of Kenya
CFSK	Computers For Schools, Kenya
CTCs	Community Technology Centers
e-COMMERCE	Electronic Commerce
GDP	Gross Domestic Product
GoK	Government of Kenya
ICT(s)	Information and Communications Technology(-ies)
IT	Information Technology
ITU	International Telecommunication Union
MDGs	Millennium Development Goals
OECD	Organization for Economic Cooperation and Development
PPP	Private-Public sectors Partnerships
SPSS	Statistical Package for the Social Sciences
TTCM	Trained teacher, adequate Technology, Courseware, Motivation
UN	United Nations
WSIS	World Summit on Information Society
VSAT	Very Small Aperture Terminal

DEFINITION OF TERMS

Access	Is technological reach to internet, an important factor for the digital divide.
Developing nation	Is country with low average income compared to the world average and generally with a low level of material well-being.
Disability	Physical, sensory, mental or other impairment which impacts adversely on social, economic or environmental participation of an individual.
Housewife	Is non-working mother, basically known as the "woman of the house", one who does not have daytime out-of- door job.
ICT service	Is any transmission of information by wire, radio waves, optical media or other means between or amongst points of user's choice.
Involvement	The technological fluency; not only knowing basic modus operandi but ability to make things of significance with them.
Interaction	Is the solving of individual problems through digital infrastructures.
Civil Servant	Is a civilian public sector employee working for a central government department or agency. This includes county employees.
Rural areas	These are all parts of the country that fall outside the boundaries of designated cities, towns, county headquarters and urban centers in line with the CBS classification.
Subscriber	Is any person who purchases a communications service, including a person who agrees to receive and pay for a service.
SPSS- AMOS	Is an add-on SPSS program which allows more advanced capabilities like modeling of structural equation and path analyses.

Tariff	Is a charge imposed by a licensee or ICT service provider for the services provided.
Technology	Is a system of hardware (tools & equipment) and software (processes & techniques) used to produce and distribute goods and services. (Yap, 1998)
Ubiquitous	This means "all over the place." Being or seeming to be everywhere at the same time; omnipresent.
Universal Service Programs	Are general macro-level universal service initiatives aimed at achieving one or more of the ICT universal service objectives.
Universal Service Fund	Is the fund established under section 84 J of the Kenya Communications Amendment Act Number 1 of 2009.

ABSTRACT

Information Communication Technologies (ICTs) are a critical input in contributing to national socio-economic development and for any nation to benefit, the nation has to ensure her citizens access and utilize ICTs. In Kenya, a study of available statistics concerning internet access could make one think that this vision may soon be realized. To achieve this, a plan of action for Kenya is needed to reduce the digital divide. The starting point is to design appropriate policies to constitute a plan of action. Borrowing from South Korean ICT policy model of access-involvement-interaction, the research adopts an empirical exploration to evaluate the policy implication that can be deduced for the Kenyan context as far as the phenomenon of digital divide is concerned. The study takes an interdisciplinary approach incorporating socio-political and economic perspectives. The research design was a survey and sampled 210 respondents in Nairobi and immediate environs consisting of three groups namely: civil servants, university students and housewives. The results indicated that access only cannot fully explain the gaps in internet use within groups, other factors as relevance of content, gender and educational level are important. The results further indicated that policy emphasis ought to focus on skills and usage access besides infrastructure access which has been the focus of many ICT related initiatives. This study led to a theoretical model proposed in this research pursuit for use in charting necessary policy considerations that must be accounted for in order to shrink the already large digital gap in the heterogeneous Kenyan society in efforts to globally position Kenya as a competitive information economy.

CHAPTER ONE

1.0 INTRODUCTION

The role of Information Communication Technologies, ICTs in economic development is increasingly moving to the core of national competitiveness strategies around the world due to its revolutionary power as a critical enabler of growth and modernization. As a result, many emerging economies have initiated projects with the aim of increasing universal access to communications; and one such nation is Kenya.

1.1 Background

Kenya recently drafted a national ICT policy (2006) and with the advent of broadband Internet, the country now faces the challenge of converting this infrastructure into a catalyst for sustainable growth for all.

It is also noted that these ICTs are still new to some people hence not accessible to all. A number of studies reveal that an Internet connection in the home does not automatically imply that all the members of the household are users (Findal, 2004). In spite of this, all these individuals are found in official statistics as citizens with access to ICTs. This indicates main concerns in this research, namely access, involvement and interaction (AII) which are notions that cannot be treated as equal. Therefore consideration has to be taken to judge options available to an ordinary citizen to have beneficial access to the Internet.

In turn, that which has come to be acknowledged, therefore, is that a gap exists between those able to access ICTs and hence participate in the information economy and those who are not. Some grim statistics of the International telecommunication Union, ITU illustrate these discrepancies.

The ITU annual report of 2010 (ITU, 2010) enlists that:-

> Sixty-two percent of main telephone lines have been installed in 23 developed countries, comprising of only 15% of world's population.
>
> Though 60% of population in developing countries lives in rural areas, more than 80% of mobile phones are found in urban regions.
>
> Eighty-four percent of mobile cellular subscribers, 91% of facsimile machines and 77% of internet-host computers are found in developed countries.
>
> There are more cellular phones in Thailand than in entire Southern Africa region.
>
> Only 34% of households worldwide had access to a telephone service as at 2005.
>
> Forty-two million households worldwide are currently on the waiting list for internet connection while 676,000 others cannot afford a connection.
>
> One-quarter of International Telecommunications Union, ITU member countries have less than one Internet-host connection for every 100 people.

The above is a grim statistic. This gap is termed as digital divide and is evident within and between nations. Indeed, Kofi Annan (2003) rightly observes “ICTs can give developing countries the chance to leapfrog some of the long and painful stages of development that other countries have had to go through.” Literature now exists about this new phenomenon and an increasing number of civil societies and indeed governments have come up with strategies to reduce the looming gap. However, what can be learnt from a number of strategies so far being employed by the developing world is that a one size-fits-it all policy no longer answers this puzzle of bridging the digital divide.

In order to illustrate the digital divide statistics for a case of Kenya, Table 1-1 provides some facts that can help define a policy perspective:-

Table 1-1: Some Facts on Telecommunications in Kenya

ICT Property	Measure
Fixed telephone lines per 100 inhabitants	0.65
Computers per 100 inhabitants (2005)	1.44
Internet users per 100 inhabitants	8.71
Broadband Internet subscribers per 100 inhabitants (2007)	0.05
International Internet bandwidth (Mbps)	1,421
Cyber cafes (2007)	1,000
Radio sets per 100 inhabitants (2002)	21.83
FM Radio Stations (2007)	48
% population with access to radio (2007)	90
TV sets per 100 inhabitants (2003)	4.64
% population with access to TV (2007)	80%
Mobile cellular subscribers per 100 inhabitants	42.11
% population covered by mobile signal (2007)	77

Source: Communications Commission of Kenya report (2009)

In bridging digital divide, three primary models have strongly emerged. The first is the community technology or using technology to meet the goals of a community at little or no cost to users. The second model is community technology centers or providing accessible facilities that offer computer access and support to people who can't afford and the third model is community content or providing material content of relevance to a target audience to motivate the use of the technology. (Beamish, 1999). In all these approaches, it is somehow important as the first step towards bridging digital divide to understand the 'divide' itself, in the context of a local situation: - what it is; why it does exist; and how it does affect the local communities.

Though, the community technology movement has gathered impetus toward closing the gap, this has still not adequately addressed the exacerbation of two separate and unequal

distinctions that currently exist. South Korea and India are living testimonies. India has astronomically boosted the economy by creating jobs through business process outsourcing, BPOs. For Korea, which at independence in 1963 was at par with Kenya in terms of opportunities in the economy (Eliza, 2005a) has leveraged on ICTs leaping stages ahead of Kenya. Therefore as a country, Kenya needs to emulate these countries that have lucratively exploited ICTs by establishing similar, if not better, systems. In the context of Access-Involvement-Interaction, AII perspective (Lee, 2003), the narrowing of the digital divide in South Korea during the 1990s indicated that the material, mental and motivational access to digital technologies were encouraged substantially and simultaneously. Though the balancing of these demands needs skills that many leaders lack, Yoo (2003) shows that this is what caused Kenya's economic demise in comparison to the experience of South Korea. In 1973, the South Korean leader, Park announced a *quixotic plan*. He targeted six areas of industrialization including ICT sector and demanded that they meet certain levels of production for export. These were met within a decade accompanied by persistent policies of the Korean government and business world.

Building on Harrison and Zappen's (2003) contention that technologies are infused with the values and social goals of their creators, this research argues that ICTs reproduce existing norms and power relations, some of which may prove inimical to Kenyan identity and information needs. To explore this claim, this research analyzed the character and dimensions of the digital divide in the Kenyan context in efforts to turning bits and bytes into nickels and dimes ~positive GDP growth~ for all Kenyan citizens, following recent investments in delivery of broadband Internet.

1.2 Digital Divide in Kenya

The Internet is a major technological innovation of the 20th century with key socio-political and economic consequences (Castells, 1996). It has revived participatory democracy (Anderson et al. 1995) and also acted as a moderator of inequality by making low-cost information available without discrimination (Hauben, 1997). Some scholars have argued that the technology has contributed to inequality given the unequal technology distribution (Novak et al, 1998). Though several claims regarding the effects of the Internet have been contested (Calhoun, 1998), the far-reaching impact is uncontroversial.

In addition, it's argued that the Internet has opened up a new democratization of intellectual practice and production (Benkler, 2006; Ibrahim 2006), espousing politics of global knowledge society.

In Kenya, 80 percent of population lives in the rural areas, where ICT services are largely unavailable, mostly engaged in subsistence farming with women constituting the majority (Omosa and McCormick, 2004); Over 50 percent live below poverty line and about 20 percent cannot read nor write; skills important in utilizing ICTs. With such a profile, it is important that suitable policies need designed to address the challenge and abridge the digital divide on an equitable manner. As noted by Tusubira (2002): - "The mechanics of bridge construction require....before constructing a bridge, one must…analyze the nature of the soil, width of the gap to be bridged, then come up with suitable design for the bridge". From development point of view, one must be sure that there will be real benefits from constructing the bridge. Indeed, it's sometimes worse to construct rather than destroy.

In Kenya, many remarks can be made about digital divide. This concept brings to minds two sets of the world, one in which there is immediacy of access and another with no or

limited access to information. Therefore, digital divide sums up all hurdles, both internal and external, that prevent any institution or individual from becoming an integral part of knowledge society, denying some level of human development (Tusubira, 2002.)

Prior research has established that the digital divide has served as an important focus of interest in policy, in Kenya and abroad. While (Park, 2004) attempted to address government information policy for the handicapped and low income class (Kuttan and Petters, 2003) suggested new approach and according to them, digital divide is a systemic and needs a holistic solution. They developed a cyber-learning concept known as TTCM, trained Teacher, adequate Technology, engaging Courseware and content and proper Motivation to help users achieve learning goals, cost effectively. The concept is related to interaction factor as argued in this thesis.

Despite different approaches to the concept, it is clear that access and use of ICT is not the norm in Africa (Raubenheimer and van Niekerk, 2002; Wilson and Wong, 2003). Kuttan and Peters (2003) claim that the situation in Africa is more of a digital abyss rather than a digital divide.

According to CCK (2009), the Internet subscribers in Kenya on all modes of connectivity grew from 3,409,896 in March 2009 to 3,648,406 in June 2009. This trend ranked Kenya sixth in the top Internet users per capita in Africa. (ITU, 2010). However, there is a skewed and uneven distribution of this usage (Zeleza, 2005). As Resnick argued, ‘access’ is not enough (Resnick and Rusk, 1996). Partially synthesizing these perspectives, this research does argue that the gap between the ‘haves’ and the ‘have nots’ will only be closed, when every Kenyan meets some criteria. First is ‘access’ or ability to readily access the Internet; as electronic mail is quickly becoming essential for participation in information society as

having a telephone (Anderson et al., 1995). The second is 'involvement' or the technological fluency; not only knowing basic modus operandi but ability to make things of significance with them (Resnick and Rusk, 1996). Finally, is 'interaction' since no more is it citizens' role simply to consume, consumer is becoming a creator (Smith et al., 1999).

1.2.1 Internet : Evolution and Situation in Kenya

The Internet first became available in Kenya in 1993 with African Regional Centre for Computing being the first provider. Formnet and Africa Online commercially followed. Internet backbone run by defunct Kenya Posts & Telecommunication Corporation was introduced in 1998 and granted exclusivity for five years. Soon competition increased with the licensing of more Internet Service Providers, ISPs by CCK to compete in both Internet gateway and domestic leased line services leading to rise in number of Internet users in Kenya. The Table 1-2 below shows the most visited websites in Kenya.

Table 1-2: Top Visited Websites in Kenya.

	Top 10 Visited Sites in Kenya		Top 10 Local Sites Visited	Rank of Local Sites Among All Visited
1	Yahoo!	1	Nation Media	12
2	Google.co.ke	2	East African Standard	15
3	Google.com	3	Kenyaonetours	27
4	Facebook	4	Haiya.co.ke	33
5	Windows Live	5	Capitalfm.co.ke	40
6	MSN	6	Kenya Revenue Authority	42
7	YouTube	7	Butterfly.co.ke	50
8	Blogger.com	8	Intokenya	53
9	Wikipedia	9	Rick.co.ke	57
10	BBC Newline	10	Best Jobs Kenya	59

Source: Alexa (2009)

Besides cost and access challenges, as evident in Table 1-2, the internet has had little local content to invoke demand. The local sites performing rather poorly compared to foreign sites. The ISPs having focused on Internet access rather than services and applications.

1.2.2 The Kenya ICT Policy : The Analysis

This section provides some useful background necessary to understand the Kenyan ICT sector's policy domain.

There have been many attempts to write a national ICT policy tracing back to 1980s. The Government of Kenya, through Ministry of Information and Communication finally issued a national ICT policy document in 2004. This generated much discussion and acclaim. The writing process was participatory with an official version released in 2006. In the words of the Head of Google East African operation, Mr. Mucheru during a TV interview "it is interesting to note that up until four years ago, Kenya actually had no (ICT) policy, it had connectivity. The policymakers have basically been playing catch up all the while."

In the proper spirit of visioning, the policy document states its vision as developing 'a prosperous ICT-driven Kenyan society' and mission as 'improving the livelihoods of Kenyans by ensuring accessible, efficient, reliable and affordable ICT services.' In a possible SWOT analysis, carrying the following are possible challenges with a commentary about its necessity:-

Policy, legal and regulatory framework: - It was encouraging to highlight this first as and it drove the amendment of 1998 Communications Act but yet to be seen whether the changes shall be beneficial or detrimental to the sector.

Infrastructure of ICT: - This is attested to in the commitment of to deliver the current fiber optic projects. Nevertheless, these infrastructures depend on complimentary sectors, particularly the electricity sector. Interestingly, electricity sector was not highlighted in Kenya Vision 2030 document, possibly because the country is not particularly advantaged with natural resource and technologies to harness electricity.

Development of Human Resource: - With an extremely successful free primary school project, the population still possesses a fairly low level of skilled ICT human resource. There are many tertiary institutions but the demand far exceeds the supply but this has also resulted in haphazard blooming of institutions. In the words of Dr. Kilemi Mwiria, the Assistant Minister for Higher Education 'the institutions are taking advantage of ignorance, desperation and education thirst of Kenyans ….offering them bogus and inadequate training'

e-Learning: - One key quality of ICT and especially the new age of Web 2.0 is collaboration. The issue of key importance would be the generation of relevant local educational content and the encouragement of educational institutions to publish most of their material online. The Massachusetts Institute of Technology's open courseware is a good example. Kenya's top entrant was Strathmore University, a private institution at 12^{th} position in Africa and $2,404^{th}$ in the world. The University of Nairobi, a leading public university came at 22^{nd} in Africa. These ratings need major improvements.

Universal Access: - There is an incredibly disproportionate distribution of ICTs and this need addressed concurrently with poverty inequality questions. Later strategies make mention of Poverty Reduction Strategy Papers (PRSP).

Public-Private Partnerships (PPP):- For a long time, the private sector has been dormant in policy making space most probably due to reluctance of previous regime, that rarely considered input from the private sector. Things have definitely been getting more positive; notable is the joint PPP investment on the East African Marine System fiber optic cable jointly funded by the GoK and the private sector.

e-Government: - The e-Government strategy paper was from the Office of the President, Directorate of e-Government. It was much needed since the varied government organs had started purchasing ICTs haphazardly. The set-up of standards required apriori formulation of an e-Government strategy.

e-Commerce: - This will be a massive project. The first steps have been achieved by the amendment of Kenya Communications Act (2008) to recognize digital signatures among several other clauses. The uptake will totally shift the business world paradigm.

Relevant Local Content Development: - This will definitely be ongoing for a long time as it is a way of developing demand for ICTs to encourage web presence.

ICT Leadership: - The need for an ICT champion from the highest possible levels of government cannot be stressed enough.

Gender and ICT: - Culturally the girl-child has been discriminated upon. Though representation of women in Kenya's work force is still low, this is expected to change considerably due to the enacted of the new constitution.

The Youth and ICT: - The policy mentions that the youth have the largest representation in the population. The challenge therefore is how exactly to engage them so that their eventual use of the technology is productive.

To ensure that a proper strategy is formulated, it is imperative to have measurable goals. Therefore, an important step in policy making is correctly framing the policy question to serve as a guide in the design of strategic approaches to the use of ICT for all.

1.3 Statement of the Problem

Globally, investment in ICTs is characterized by uncertainty over expected benefits and huge irreversible costs (Fichman, 2004). The flow of technology into Africa has been on the rise but there has been a growing concern over low returns and failed technology implementations in the continent (Odedra, 1993).

Blind technology deployment without complete evaluation of factors that influence user adoption and acceptance can therefore be perilous in Africa hence the importance of social cultural settings in technology benefit across regions (Evers & Day, 1997). The existing literature indicates no evidence that AII perspective has been tested in Kenya among possible digital users. As Warshauer (2003) states: - **'**…the stratification that does exist regarding access to online information has very little to do with Internet per se, but has everything to do with political, economic, institutional, cultural ….contexts. Thus, the inequality ….is social, not digital**".** According to Stone (2001), these need addressed at local, national and global levels for the divide to be narrowed or closed altogether.

In conclusion, it can be argued that it is critical to include ethical, economic, social and other concerns specific to respective societies as an explicit part of analyzing digital gaps. If policy researches included recognition of social ethos and motivation with the findings, it is envisaged that better results and alleviation strategies would be produced with more defensible linkages to ground realities for deliberations regarding the diffusion of Internet,

ICT and its related technologies to the society of interest leading to a more efficient policy prescriptions.

1.4 Objectives

The research aimed to evaluate AII policy model and infer policy and strategies to bridge digital divide in Kenya. The specific objectives were:-

i) To assess the policy implications of *access* in the context of AII model in bridging the digital divide in Kenya.

ii) To assess the policy implications of *involvement* in the context of AII model in bridging the digital divide in Kenya.

iii) To assess the policy implications of *interaction* in the context of AII model in bridging the digital divide in Kenya.

1.5 Research Questions

Related to the statement of problem and objectives above, this study sets out to answer the following research questions:-

i) What are the policy implications of *information access* in the context of AII policy model in bridging the digital divide in Kenya?

ii) What are the policy implications of *information involvement* in the context of AII policy model in bridging the digital divide in Kenya?

iii) What are the policy implications of *information interaction* in the context of AII policy model in bridging the digital divide in Kenya?

1.6 Hypotheses

The following were the primary hypotheses of this research thesis:-

i) *Information access* in the context of AII policy model is a determining factor in bridging the digital divide in Kenya.

ii) *Information involvement* in the context of AII policy model is a determining factor in bridging the digital divide in Kenya.

iii) *Information interaction* in the context of AII policy model is a determining factor in bridging the digital divide in Kenya.

1.7 Significance of the study

'We,..representatives of people of the world…in World Summit on Information Society, WSIS declare….common desire to build a people-centered, development-oriented information society, where everyone can…access, utilize and share information….to achieve full potential and improve quality of life.**'** This is how the Geneva Declaration of Principles (ITU, 2005) begins. Agreed and signed at end of first phase of WSIS, it represented the acknowledgement that Internet has transformed the world and plays a key pivotal role in welfare for everyone. Thus, it is necessary to foster its development where such development is having difficulty in being endogenous or self-emerging.

There is extensive evidence that any analysis of social situations which does not look at structural and cultural factors is liable to being partial and misleading (Bell 1986:40). Therefore in Kenya it was clear that those socio-economically disadvantaged groups would become further disadvantaged if they experienced continued technology exclusion.

Therefore, this study is important for the developing nations including GoK policy makers for improving the general state of ICTs with target users' lifestyles in mind. The cross-sectional study would inform researchers in social informatics to come up with policy recommendations to resolve local factors found to be widening the digital divide in specific. Finally, the rigorous qualitative and quantitative data produced contribute to the limited knowledge dealing with digital divide issues. This information could help justify increased government funding for meaningful uses that serve individual and collective motivational interests.

1.8 Scope

This thesis explored how Kenyans perceive 'digital divide' and yielded policy implications from research results with a representative sample of citizens of Nairobi and immediate environs. The research overviewed 'digital divide' literature relating to Kenya and abroad, empirically exploring indicator variables linked to its existence.

1.9 Limitations

Like any kind of analysis, this research faces some limitations. The lack of time series data to study changes of time and also the use of proxies instead of hard or soft data to represent indicators. This is because it was assumed that interviewed civil servants are the major executors of public policies. Third, working with small samples, statistically speaking, which became smaller with special focus on sub samples was a limitation. However, conclusions are quite robust as close to boundaries of statistical significance was applied.

Fourth, the ever-changing nature of technology puts this model at possible conflict with theories within several months range. This would ask of the model to be designed in

approximation using structural equations with latent variables which might eliminate this limitation in future researches.

Fifth, there could be exceptions and variations in ICT uptake away from Nairobi. It is recommended for future lines of this work to consider all these to observe the complexity of patterns for greater predictive accuracy and model stability.

Sixth was the ethics challenge that social-ethnographic researches pose, particularly in terms of informed consent and assessments of participant's socio-economic status. Therefore, clear monitoring procedures were employed.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The digital divide is a geographical division. This can be a global, regional or national (Rao, 2003). The term global digital divide is often used to describe disparities in access. The disparities in intensity of ICT adoption among countries is wider than disparities in their GDP per capita, indicating that the divide is increasing and likely to be more severe in the future (Wong, 2002.)

In addition, liberalization of ICT sector in Kenya in the last few years has led to a rapid growth in technology deployment (Oyelaran-Oyeyinka and Adeya, 2004) but a majority of potential users are yet to enjoy the technology. Of course, there exist researches on digital divide conducted in social welfare aspects (Mbarika et al., 2007) of which most are conducted with no definite viewpoints. Considering the conceptual miscellany and direction of the digital divide, there is a need to conduct research with comprehensive viewpoints covering all or near all digital divide resolution facets and most if not all layers of the society. In this study, attempts were made to label the facets and the following sections formed the groundwork for the theoretical and conceptual frameworks.

2.2 Theoretical Framework of Digital Divide.

The term digital divide is widely used and misused in papers concerning information society. Though its terminological exactitude is not crucial at this point, in another world it might have been the silicon split, the gigabyte gap or the Pentium partition, (Fink and

Kenny, 2003). Simply, this is the gap between the haves and have-nots regarding access to and use of ICTs and the Internet (Sciadas, 2003.)

There are several reasons why the gap, which is the digital divide, exists. The most obvious one is the unequal distribution of economic wealth in the world. This is often as a result of unequal ownership of the means of production and unequal access to economic and social goods and services (Kimalu et al, 2002). Of the four top countries with the highest degree of income distribution inequality in the world, two are African: - Kenya and South Africa. Kenya being the low income country in the world with the highest degree of the income distribution inequality (Sakwa, 2006.) Another major related reason is explained by the slow diffusion of new technologies and associated difficulties in technology roll out around the world (Bridges.org, 2001) or the lack of political will, failed government policies or too much government intervention.

According to Fink and Kenny (2003), there are at least four possible explanations. 'access' gap to ICT use or teledensity of Internet host computers, 'ability' gap or ICT literacy base, 'actual use' gap measured by how many, what purpose and for how long the Internet hosts are used and finally 'use impact' gap measured by economic returns. These four explanations suggest that the digital divide is a relative concept. In order to evaluate any progress made by developing countries it must therefore be examined against the progress made by developed countries (Sciadas, 2003.) This explains the comparison between Kenya and Korean ICT economies in this research.

It is thus important to note that the digital divide often follows and reinforces existing inequality and poverty patterns (Pigato, 2001) and the introduction of more ICTs is simply

exacerbating social and economic divides - not only between developed and developing countries but also between socio-economic groups in-country.

To conclude, the divide exists at different levels: - in the infrastructure access, in the social access and professional knowledge and can be between or within countries; where the urban, the rich, the educated, and the young, often males are most likely to use ICT (Fink and Kenny, 2003); (Heeks 2003); (Pigato, 2001). Mani explains 'that within each nation, there are people with limited or no access to ICTs; generally underprivileged communities, traditionally marginalized, women, the aged, those located in remote areas…digital divides reflect socioeconomic divides" (Mani, 2002)

2.2.1 The Information Chain and Digital Divide

To fully comprehend information-related divides one must be able to access data and assess if they are useful and applicable for their situation, before they can act upon them (Heeks, 1999) and this can't happen unless one has the skills and expertise to transform data into useful information. Heeks uses a **4 A**s model '**A**ccess-**A**ssess-**A**pply-**A**dapt.'

The elements in the information chain can be clarified as follows: - if data is unprocessed, it might not be useful (Heeks and Duncombe, 2001) hence if 'accessed' one has to estimate underlying value in order to adapt it for a purpose. The data is transformed into information (Checkland and Holwell, 1998). According to Fuchs, people want to add value to what they presently do (Fuchs, 1997) which means that information gets assimilated into a coherent framework of understanding (Schueber, 2003). Fuchs states that more and more of what gets offered moves up the value chain towards knowledge and wisdom. These happen at different levels hence creating the digital gaps between groups.

2.2.2 Surrounding Components of Digital Divide

Information creates knowledge also facilitated by existing knowledge, meaning that knowledge is needed to create information (Heeks, 1999). But other surrounding components must also be present. Heeks distinguishes data, overt, social and action resources. Deficits in any can threaten the effective functioning of the ICT information chain and become an access barrier for poor people hence data resources should be relevant for the purpose; overt resources should allow Internet infrastructure access. These include electricity supply and ICT literacy skills to make use of the content. The other is social resources that affect assessment and application of ICT. This is to mean that data is created within a context and retains embedded characteristics of that context and unless the recipient come from the same context as the sources creating information, problems of miscommunication and misunderstanding can arise (Heeks and Wilson, 2000). The other social factor is trust for technology. The last are action resources and are affected by inequalities in endowment of overt and social resources for action therefore keeps poor entrepreneurs poor regardless of whether information supply is via ICTs. For many people in developing countries like Kenya, the problem is that the resources needed for a functioning information chain are often absent (Heeks et al, 2003).

2.2.3 Real Access or Real Impact Theory

The theory consists of two interrelated theories: - the Real Access Criteria and 8-Habits of Highly Effective ICT-Enabled Development Initiatives (Heeks *et al*, 2003).

2.2.3.1 Real Access Criteria

Providing access to ICT is critical, but if ICT is to make a real impact people have to understand how to put it to use, or they will get discouraged from using it; or the local

economy may not sustain its use (Bridges.org, 2001). Therefore, Real Access or Impact Model recommends '8-Habits of Highly Effective ICT-Enabled Development Initiatives.'

2.2.3.2 Eight Habits of Highly Effective ICT Initiatives

The ICT initiatives should be built upon best practices or '8-Habits of Highly Effective ICT-for-Development Initiatives' for good health of the ICT initiatives. This involves target group needs assessment, disseminating best practices, ensuring local buy-in, taking small achievable steps, critically evaluating efforts, addressing key external challenges beyond the direct project control, making it sustainable and finally involving groups traditionally excluded on the basis of gender, race, religion or age or other social factor. If groups are alienated for social or cultural reasons it not only hinders ICT penetration but also limits benefits of information society (Heeks, 1999). The theories above can be applied to all type of Internet utilization in the developing nations like Kenya.

2.3 The AII Model and Critical Influencers of Digital Divide.

Expanding on the previous sections, Compaine (2001) says in his research that the digital divide is the perceived gap between those who have access to the latest technologies and those who do not. The standard example defined in technological terms can also be found in OECD (2001) and hence the suggestions that the speed of technological evolution may be considered at the same time for digital divide resolution (Hoffman & Novak, 1999). This is also related to the concept of universal service that has explicitly emerged in Kenya in the decade ended. In relation to information access, Katz et al. (2001) says '…..the first fundamental concern is access, what motivates people to use the…what barriers are there to the usage; and what characterizes those who 'drop out'.....'

Therefore, following the definition of digital divide from the technological viewpoint there is the limitation of presenting its general unilateral phenomenon. The digital divide may be seen at the same time to have the aspect of information involvement (Katz & Rice, 2003). Even though an access opportunity to ICTs is provided, what is mostly important is to have interest in the digital infrastructure. The concept of information welfare first introduced in Korea in 2000 may have been seen as phased policy for digital divide resolution. The major projects conducted at that time were free computer education aimed at promoting the involvement of isolated class as a policy goal. (National Information Society Agency, 1999: 483). This naturally leads to information interaction which refers to doing business through digital infrastructures. This moves the focus from the 'access' gap to encompass an 'interaction' gap as depicted in Figure **2-1**: -

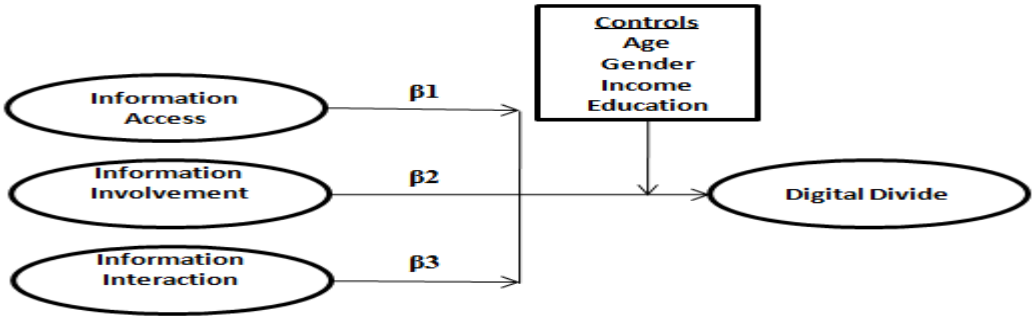

Figure 2-1: The Conceptual Framework of Digital Divide

2.4 Towards Internet Ubiquity

To advance the AII policy perspectives is the Global IT Report on stages towards Internet ubiquity. The stages incorporate Internet access, familiarization of use and intensive use of Internet-based services. These variables escalate up the stages.

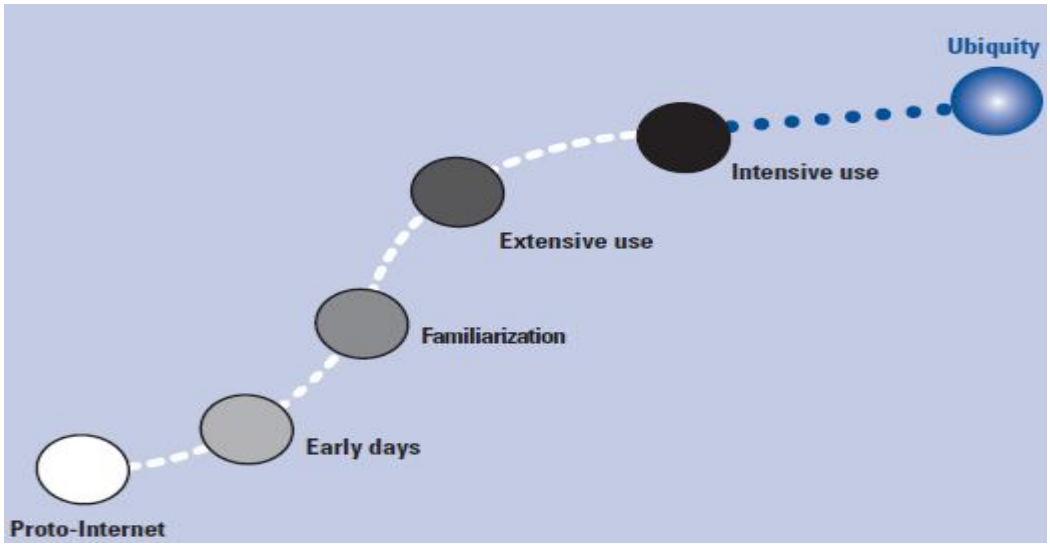

Figure 2-2: The Five Stages to Internet Ubiquity

Source: Global Information Technology Report based on ITU, 2010

2.5 Conceptual Framework

The framework in Figure **2-1** identifies building blocks of an information society. Recognizing the efforts of the factors and their complex functioning, the model proposes a three-dimensional conceptual framework, structured along horizontal and vertical lines of interest with underlying socio-cultural and political factors.

Indeed (Lenhart, 2000; Compaine, 2001; Parks Associates, 2007) have found that there is a non-marginal amount of citizens in developed countries that are not connected to the Internet and the reasons are neither related with physical access nor affordability, even if they had reach to the networks, they would not find them useful. In line with the concept of digital inclusion, conceptually having access but using infrequently can be regarded as better than having no access. According to (Kim T.R, 2003), prior research in Korea established the structure of effect of digital divide in public sector. Based on multilateral

perspectives, he concluded that **i)** digital divide structure is varied according to individual and organizational variables **ii)** access to information infrastructure is the least important and finally he suggested **iii)** that it is necessary to device relevant ICT contents and suitable policy measures to improve ICT competence. Kim's research is important in bringing out the sense of selecting research target of staff of the public service for this research. These viewpoints are the ones this research identified in Kenya and attempted to test for natural resolution of digital divide as suggested by a number of authors (Cullen, 2001; Hoffman and Novak, 1999). The research emphasizes that access divide be reduced by policy changes from access divide to acceptance divide and production divide.

2.6 Digital Divide: Local and Regional Factors

At the regional level, Africa is in a particularly ghastly condition. It is not only the poorest region but her poor are the poorest of the world's poor (Sakwa, 2006). In addition, according to a report (UN ICT Task Force, 2002), the digital divide is at its most extreme severity in Africa compared to other regions. Sub-Saharan Africa remains at the bottom of the list of developing regions having only one-third of the internet penetration compared to North Africa or one-thirtieth of the European penetration (ITU, 2010).

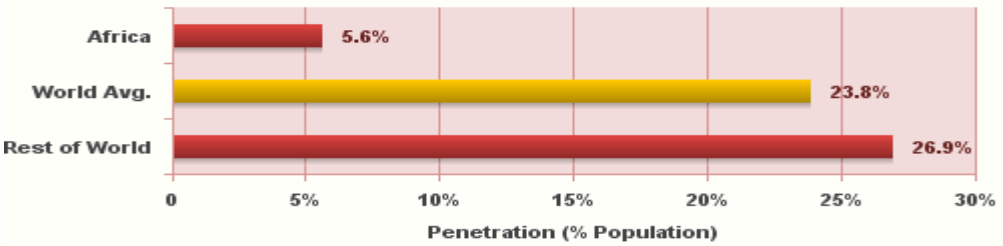

Figure 2-3: Internet Penetration in Africa, 2010 Q1 March 2009

Source: Internet World Statistics, 2009

Therefore, Sub-Saharan Africa is the most digitally isolated region in the world and also with the highest connectivity costs in the world (Juma and Moyer, 2008).

To further advance the underlying influences of AII policy perspective, studies have found that higher status families with higher levels of education are more likely to have children who use the internet (Tsatsou, *et al* 2009).

Towards this end, Korean government vigorously pursued a wide range of programs since 1980s. The technological diffusion was by raising public awareness on importance of ICTs in everyday life besides a hardware-oriented approach through the launch of a universal service policy (Kim and Lee, 1991; Sung, 1994)

The Internet World Statistics notes that African continent has approximately 54,171,500 as at March 2009. The Internet user being one aged 2 years and above who went online in the predefined period of 30 days. Figure 2-4 shows national breakdown in Africa.

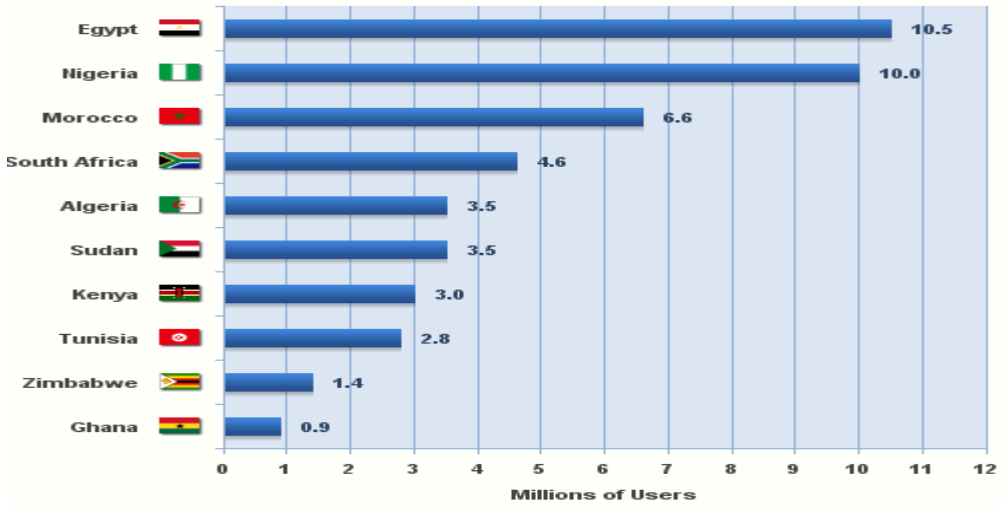

Figure 2-4: National Breakdown of Internet Users in Africa, Q1 March 2009

Source: Internet World Statistics, 2009

Even if access-oriented definition as commonly used in literature is pursued, the digital divide is still not understood if it is viewed purely as a technological phenomenon. A broader interpretation of the digital divide is necessary (Joseph, 2001; De Haan, 2004; Rao, 2005). Van Dijk and Hacker (2003) claim that the extent and the nature of it depend on a multifaceted concept of access, where difference has to be made between four kinds: 'mental access', 'material access', 'skills access' and 'usage access.' Though the public opinion and policy have been preoccupied with the second kind of access, access problems has been observed as gradually shifting from the first two kinds of access to the last two.

The literature addresses the digital divide in relation to different scales. Some authors (Leigh & Atkinson 2001; Rooksby, 2002a) consider the digital divide from an individual's perspective. For example (Lenhart, 2000) found that individuals without access to ICT were less networked or do not trust technology and worry more about privacy breaches. In contrast (Beamish 1995; Leigh & Atkinson 2001) view the digital divide from the perspective of communities. (Leigh and Atkinson, 2001) believe that by providing citizens with access they may become more active in local community issues but (Beamish,1995) notes that by providing access to ICT, it is possible to vitalize existing communities, advancing citizens involvement in public affairs, creating virtual communities and more efficient systems of governance. In contrast to previous authors, others discuss the digital divide at a country level (Curtin 2001; Rao 2003). These studies at different levels provide important statistics that is particularly significant when it was recognized that at the start of 2000 that only 5% of the world's population had accessed the internet (Tiene, 2002).

2.7 Summary and research gaps

In many countries, including Kenya, the issue of the geography where a person is located, age, occupation, education level, income level and gender are some of the main hurdles to acquiring ICT based skills (CCK, 2010).

Many research reports exist about digital divide as well as their discrepant interpretations. It is, however, argued here that a major problem with much of the research in developing countries as Kenya is a failure to include ethical and social concerns as an explicit part of analyzing digital gaps. Evidence for this is portrayed by the differences in prosperity between the societies of North and South Korea in spite of having common culture until end of Second World War in 1945; whereas the North is at present plagued with the digital divide, the South seems to have alleviated it. Culture in this context is not just a random collection of values. It constitutes a survival strategy (Inglehart, 1997:22).

Therefore, if researches included recognition of social ethos and power relations with the findings, it is envisaged that better results and alleviation strategies would be produced with more defensible linkages to ground realities for suitable policy.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the description of methods that were applied in this study. It covers research design, study population, sample design, data collection and analysis.

3.2 Research Design

In carrying out this empirical exploratory research, analytical design was selected because of its capability to describe a population that is too large to observe directly (Mugenda & Mugenda, 2003). This was planned to obtain pertinent, applicable and precise information on the independent variables identified in the conceptual framework.

This involved a qualitative and quantitative methodological framework, consistent with indigenist research principles (Smith, 2002) using semi-structured questionnaires to explore reflections of the participants. The participants self-selected according to their desires, communicating their experiences in keeping with the principles of empowerment.

3.3 Area and Population of Study

The study targeted ordinary citizens in Nairobi and immediate environs. According to CCK (2010) about 63% of Kenyan total households own mobile phones while 105,367 own landlines.

Three groups were given special attention. While the civil servants were chosen to represent major executors of public policies for resolving the digital divide, the students

were chosen as frequent users of digital infrastructures, future policy leaders and makers in Kenya hence their awareness would serve as a major index for the digital divide policies. Finally, choosing housewives aimed at recovering the analysis limitation that the research had on data mainly from the vulnerable class like the disabled and the rurally based.

3.4 Sample Structure

This comprised ordinary citizens in Nairobi. However, as (Babbie, 2003) noted, this research did strive to have accurate measurements and emphasized on surveyed secret to raise the response rate for the employed questionnaire reducing errors and prejudice. The total sample size used is provided in Table 3-1:-

Table 3-1: Clusters and Respondents

Cluster	Cluster (or Sub Sector)	Frequency
1	Civil servants	70
2	Students	70
3	House Wives	70
	TOTAL	210

3.5 Sampling Technique

From the list of respondents served with questionnaire in Nairobi with an estimated population of 3,240,155 according to CBS (2004) simple random sampling technique (Cooper and Emory, 1999) was used to select the public service offices and classes where civil servants and student respondents respectively were served with the questionnaire while snowball sampling was used for housewives. This provided for sectoral representation (Kothari, 2004.) The snowball sampling was principally applied because the researcher did not have access to sufficient people with the characteristics being sought

(Heckathorn, 2002) and so the researcher asked some respondents accessed to refer him to other people who fit study requirements. This chain referral process allowed the researcher to reach populations that were difficult to sample using other sampling methods.

The appropriate sample size was determined largely on the basis of cost of sampling, how much was already known about the population parameters, practicability, precision of the final estimate required, estimated prevalence of the variable, that is ICT usage, in the area of study, and the desired level of confidence. For this research design, the sample size was calculated as follows:-

Equation 3-1: Sample Size Formula

$$n_o = Z^2 pq \,/\, e^2$$

Source *(Bruin, 2006)*

$\mathbf{n_o}$ = required sample size for a normal distribution, **Z =** 1.96 is the standard value at confidence level of 95%, **p** = estimated prevalence of ICT utilization in the research area, that is, 10.2 % (CCK, 2010) and e = desired margin of error at 5 %, that is a standard value of 0.05.

$$n_o = \left[\left[1.96^2 \times 10.2\% \times (1 - 10.2\%) \right] \,/\, 0.05^2 \right]$$

$n_o = 140.75008$ Thus, 210 respondents were administered with the questionnaire.

3.6 Instruments

An important step in policy making is correctly framing the policy question and hence 36-item questionnaires, consisting of both consisted of both closed and open-ended questions,

designed with AII perspectives in mind were administered to the respondents for primary data collection. A 5-point-Likert scale was employed ranging from 1 to 5 representing-strong objection (**SO**), objection (**O**), not aware (**N**), affirmation (**A**) and strong affirmation (**SA**). Once data had been coded for all responses from 'strong objection' to 'strong affirmation', it was estimated the higher the points, the lower the digital divide or higher the universal access. Like interviews, the open questions provided in-depth information about research issues and since these were not amenable to statistical analysis, they aided in qualitative analysis complementing the closed items. Through these the respondents were able to share their perception in regards to ICT situation. (Cohen et al., 2000) explains that interviews are not simply concerned with collecting data about life: it is part of life in itself; their human embeddedness is inescapable.

Besides, ICT policy indices were obtained on Africa, Kenya in specific. The specific institutions rich in this information were Communication Commission of Kenya, United Nations Organizations and Kenya National Bureau of Statistics.

3.7 Data Collection Procedures

The attitudinal self-administered questionnaires were distributed. These were emailed to target persons with email address after discussions on phone (Buzzard, and Edgcomb, 1992; Cooper and Emory, 1999). The subjects were requested to complete the questionnaire in the morning or late evening to avoid disrupting daily activities (Kothari, 2004). The qualitative methods were also applied included direct observation at the research site and recorded via field notes. Finally, document analysis technique was employed for documents collected from Kenya National Bureau of Statistics, United Nations organizations and Communication Commission of Kenya.

3.8 Pilot Testing

General pretesting of questionnaire was conducted with 27 selected subjects; equally spread across the sub-samples. The constructs for each subscale were tested for two psychometric properties, validity and reliability. The formal validity and content were checked based on expert view whether these were eliciting meaningful responses. As (Cooper and Emory, 1999) noted the feedbacks from end users were used to further refine the instrument. The pre-testing helped set the expected time of between 15 to 20 minutes needed to increase readability to complete the questionnaire. Particular attention was given to wording, sequencing and general presentation of the items of the questionnaire.

For consistency, dimensions in analysis model underwent Cronbach's Alpha Test to determine whether measured items had any flaws to hamper statistical validity of administered questionnaire. Conceptually, formula for the standardized Alpha test is: -

Equation 3-2: Standardized Cronbach's Test

$$\alpha = \frac{N \times \bar{c}}{\bar{v} + (N - 1) \times \bar{c}}$$

***Source** (Bruin, 2006)*

N is the number of items, $\bar{c}$ is the average inter-item covariance among the items and $\bar{v}$ represents the average variance. Thus, if number of items increases, the alpha (α) increases and if average inter-item correlation is low, alpha would be low, holding other items constant. A reliability coefficient of α = 0.600 or higher is considered acceptable in most social science research situations (UCLA, 2007) and was chosen as desirable reliability threshold for this work.

3.9 Data Processing, Analysis and Presentation

The returned questionnaires were centrally recorded (Cooper and Emory, 1999). The quantitative and qualitative data having been analyzed separately, a final analysis was attempted to synthesize the findings. The questionnaires that had more than one incomplete construct or entire sheets left blank were discarded. The correctly filled-in questionnaires were retained for analysis after cleaning and coding procedures. The Likert scales were averaged in Statistical Package for Social Sciences, SPSS for each dimension and the values used for subsequent analysis (Anderson *et al.*, 1993).

3.9.1 Description of Data

The data analysis was done via SPSS. The descriptive statistics was derived to determine the sample characteristics (Anderson *et al.*, 1993) in terms of gender, income level, education level and age of the respondents for each of the dimensions. Besides, percentage statistics were derived for the scale measures. The scales for each factor were summed to derive the mean value of each independent variable (Cooper and Emory, 1999).

3.9.2 Exploratory Factor Analysis

Prior to assessment of the fitness of the analysis model, the validity of the AII model was examined through exploratory factor analysis. In addition, 'KMO and Bartlett's Test' was conducted and if KMO < 0.5, then the researcher should collect more data or rethink on the variables to include as the variables are considered not measuring a common factor.

The hypotheses were summarized as follows: - 'access' in context of AII policy model is a not determining factor in bridging the digital divide; 'involvement' in context of AII policy

model is not a determining factor in bridging the digital divide; 'interaction' in context of AII policy model is not a determining factor in bridging the digital divide in Kenya.

To test the hypotheses, four major variables were set forth. Two latent variables attached to each dimension of AII process and each latent variable equipped with a measurable variable as shown in Table 3-2:-

Table 3-2: Latent and Measured Variables

DIVIDE DIMENSIONS	VARIABLES	
	Latent Variables	**Measured variables**
Information Access	Information Infrastructure	Mechanic Access
	Access Opportunity	Access Gap
Information Involvement	Internet Interest	Use Confidence
	Use Motive	Internet Function
Information Interaction	Work Performance	Utilization Level
	Information Literacy	Utilization Dependency
Digital Divide	Gap To Use Infrastructure	Utilization Number
	e-Inclusion	Constraint Cognition

Source: *Katz & Rice (2003)*

In order to explain the percent of variance in the dependent variable explained linearly or nonlinearly by the independent variable, eta^2 was applied. Since eta^2 cannot prove causal direction, it measured the level given the researcher's assumption of causal direction. Hence eta^2 did not have sign and varied from 0 to 1.0 (Siegel, 1956). In using eta^2, the second variable was ensured categorical.

The exploratory factor analysis was used to determine the ability of the predefined factor model to fit observed set of data as localized by the research samples on the basis of pre-established theory. However, for more interpretable results, 'Oblimin with Kaiser Normalization' was applied in component matrix rotation and indicator variables that were least significant in explaining resulting factors were excluded in the subsequent analyses.

3.9.3 Cronbach's Alpha Tests: Subscales Reliability and Validity

In this section, the constructs for each of the resulting factors in the analysis model underwent Cronbach's Alpha Test. This was to measure the overall strength of association between AII theory factors and the sets of indicator variables.

3.9.4 Path Analysis and Causal Correlation

Following a satisfactory analysis to determine the interrelationships of AII theory, path analysis was conducted. This was used to investigate the causal model to give the implication of plausibility of pre-specified research hypothesis in terms of magnitude and significance of causal connections between a set of variables through the sizes of path coefficients. The direction of causality was drawn followed by regression and path analyses to link empirical findings with the theoretical model. The regression models formed using **DD**-Digital Divide dimension; **IA**-Access dimension; **II**-Involvement dimension; and **IT**-Interaction dimension.

Equation 3-3: Unstandardized Parameters of Regression Models

$DD = \beta_1(IA) + \beta_2(II) + \beta_3(IT) + \beta_o + \varepsilon_o$ where $\beta_o, \beta_1, \beta_2, \beta_3$ are unstandardised parameters of the regression models with ε_o as the error estimate.

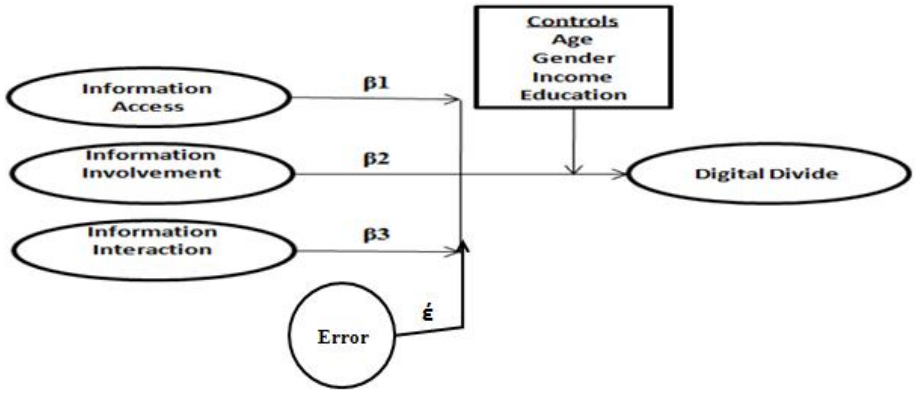

Figure 3-1: The Theoretical Model

R^2 was computed to give the relative predictive power of the model. The closer it is to one, the better the model fit AII is in its ability to predict.

CHAPTER FOUR

4.0 RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter discusses research findings, interprets data analysis against the backdrop of research questions. The quantitative aspects were enhanced with qualitative facets by exploring the empirical relevance of the theoretical domain.

4.2 Description of Data

There was 83.0% rate of response as out of 210 questionnaires that had been disseminated, 166 were returned with 13 among them having errors. A total of 150 questionnaires were used for analysis and Figure **4-1** shows the sample characteristics.

Table 4-1: Respondents: Sample Characteristics

	Civil Servants		Housewives	Student		Total	Percentage
Age Cluster	Female	Male		Female	Male		
15-24	-	-	4	33	7	44	29.3
25-34	10	10	18	3	3	44	29.3
35-44	5	8	12	-	-	25	16.7
45-54	7	5	13	-	-	25	16.7
None	-	-	-	-	4	4	2.7
Over 52	-	5	3	-	-	8	5.3
Grand Total	**22**	**28**	**50**	**36**	**14**	**150**	**100**

See Appendix Table 4A-1, Table 4A-2 and Table 4A-3 detailing the sample attributes in regards to age, education and income levels respectively.

Though 28.6% of male students did not indicate their age, students were largely in late teens and early 20s. In addition, at least 34% of the respondents had secondary level of

education. For the housewives, 6% had at least a degree and 80% of them with income at bare minimum.

In the factor analysis five factors resulted. The measured items for each of the five subscales were tested for reliability. Figure **4-1** presents the resulting Empirical Frameworks.

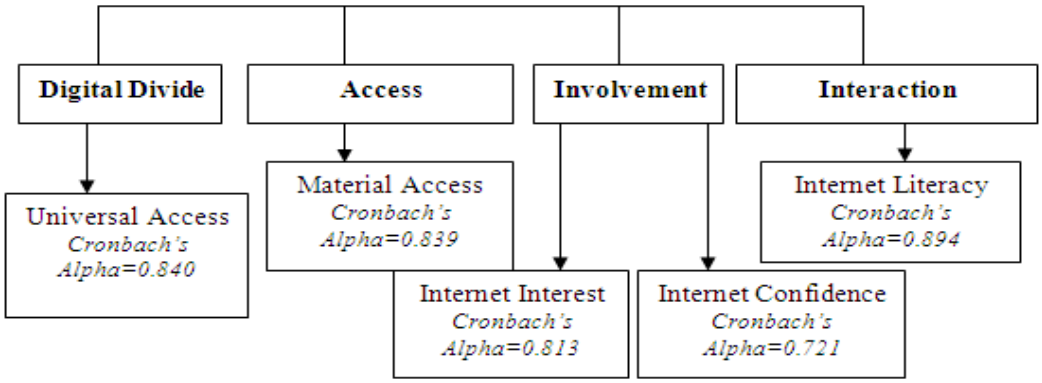

Figure 4-1: Factor Analysis and Reliability Test

As shown in Figure **4-2**, each factor underwent Cronbach's Alpha Test. The overall value was 0.934 hence the measured items had no flaws to hamper statistical validity of the results. See Table 4A-4 and Table 4A-5 for factor loadings of the five subscales and Eigen *values* respectively. All factors returned a KMO measure > 0.5 as shown in Table **4-2** thus sampling was adequate and factors extracted exhibited acceptable degree of common variance.

Table 4-2: Empirical Factors: Measures of Sampling Adequacy

		U.Access	M.Access	Interest	Confidence	Literacy
KMO Measure		0.75	0.79	0.68	0.51	0.79
Bartlett's Test	Chi-Square	513.73	379.13	89.36	93.77	474.63
	df	15	15	3	1	6
	Sig.	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001

See Table 4A-6 in the Appendix for associated communality values for each factor variables. There exists a substantial proportion of variance that each item has in common with other items.

In part, the empirical findings appear to match theoretical insights for 'digital divide' and 'access', each constituting a factor. In contrast, theoretical insights of 'involvement' and 'interaction' resulted into three separate concepts each constituting a factor. These were labeled 'internet interest', 'internet confidence' and 'internet literacy' respectively.

From the factor loadings and measures of sampling adequacies, a significant strength of association between AII theory factors and sets of measured indicator variables exists.

4.2.1 AII Theory Dimension and Factors

Following exploratory factor analysis, responses were analyzed based on attitudinal scales constructed. The mean scores were interpreted as 'Strong Objection' (1.00-1.79), 'Objection' (1.80-2.59), 'Not aware' (2.60-3.39), 'Agreement' (3.40-4.19) and 'Strong Agreement' (4.20-5.00.) The next sections explore empirical relevance of the theoretical insights.

4.2.2 Digital Divide : An analysis

Following factor analysis, all items of 'digital divide' appeared to belong to one factor with a reliability of $\alpha = 0.840$. This was labeled 'universal access'. The general concept was

operationalized as “Your access to the Internet is the same compared to other people”. The means of the scale constructed on this basis appears in Table **4-3** while Table **4-4** shows ANOVA pair wise comparison for means.

Table 4-3: Sample Means: Digital Divide Dimension

	Mean		
Factors	Students	Civil Servants	House Wives
Universal Access	3.23	3.66	1.92

Table 4-4: ANOVA Pair wise Means Comparison

Tukey’s Honestly Significant Difference (HSD) Test					
Variable	(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.
Universal Access	Student	Civil servant	-0.435	0.125	0.002
	Student	House wife	1.302	0.125	p<0.001
	House wife	Civil servant	-1.737	0.125	p<0.001

See Table 4A-7, Table 4A-8 and Table 4A-9 in the Appendix for ANOVA mean comparison of the factors against the background characteristics of gender, income level and age for the sub samples.

The digital divide awareness is lower in civil service than in students; housewives affirm a relatively bigger divide indicating lowest universal access. There exist a significant association between one’s gender and divide awareness among the students (males: 3.336, females: 2.940). It is indeed true most ICT-related University programs are dominated by males. Though no significant difference in universal access between gender in civil service, in general population the difference between gender seems significantly high ($p<0.001$). Table 4-5 shows the relationships of income and age for AII dimensions.

Table 4-5: Universal Access Measure of Association: Income and Age

	Students		Civil Servants		House wives		Overall	
	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig
Access * Income	0.026	0.554	0.617	p<0.001	0.055	0.100	0.633	p<0.001
Access * Age			0.330	p<0.001	0.699	p<0.001	0.051	0.058

This empirical perspective on awareness of *digital divide* agrees the theoretical perspectives that the divide exists within countries; the rich, the educated, the young, males are more likely to use ICT (Fink & Kenny, 2003; Pigato, 2001; Heeks et al., 2003; Pigato, 2001). Unlike civil servants, there appears to be no significant association between digital awareness and income level for students and housewives. In overall, income is an aspect of significance in defining one's digital divide awareness. In addition, significant association between age and impact of digital divide is noted among civil servants and housewives.

Hence, the AII approach suggested in this research has the considerable application as a theoretic model for bridging the digital divide in Kenya. As mentioned by other scholars, it is important to consider holistically these elements of influence and choose flexible ICT strategies depending on specific situation (Baskaran and Muchie, 2006; Mossberger *et al*, 2003). The comprehensive elements of influence to universal access awareness are age, gender and income level of policy targets as and lack of consideration for these has led to disjointed universal access policies leading to the 'universalization' of the universal service problem which may mean implementation of same policies in different counties for all ages irrespective of socio-cultural, political and economic elements.

4.2.3 Information Access : An analysis

Resulting from factor analysis items of 'access' appeared to belong to one factor with (α = 0.839.) which was renamed 'material access' and its general concept operationalized as

'Your access to the Internet is more probable compared to other people.' The mean of the scale is shown in Table 4-6 while Table 4-7 shows ANOVA pair wise comparison of the means. This agrees with the theoretical perspectives. Thus, there exists a significant difference in 'access concept' as perceived among students, civil servants and housewives.

Table 4-6: Sample Means: Information Access Dimension

	Mean		
Factors	Students	Civil Servants	House Wives
Material Access	3.19	3.78	2.05

Table 4-7: ANOVA Pair wise Means Comparison

Tukey's Honestly Significant Difference (HSD) Test					
Variable	(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.
Material Access	Student	Civil servant	-0.583	0.134	p<0.001
	Student	House wife	1.14	0.134	p<0.001
	House wife	Civil servant	-1.723	0.134	p<0.001

See Table 4A-7, Table 4A-8 and Table 4A-9 in the Appendix for ANOVA mean comparison of the factors against the background characteristics of gender, income level and age for the sub samples.

Though access to the internet is probable to all, unlike civil servants and students, for housewives it seems least. This is higher among civil servants than students. University students have recognition on the importance of online resource access for research but one of the major barriers is the cost implication for possible access hence possible reason for significant difference in access probability between civil servants and students. For the vulnerable class represented in this research by housewives, a significant level of difficulties in terms of Internet access exist may be due to location or physical disabilities.

There exist significant relationships between one's gender and access to internet among civil servants with means of (males: 4.071, females: 3.402). As shown in 4A-7, though no significant difference in regards to 'access' between gender amongst students exist, in the general population the difference seems significantly high ($p<0.001$) Besides, there appears to be significant level of association between internet access and income level for all samples giving percent variance in Internet access as explained by variation in income for students, civil servants and housewives as ~49%,~70.6% and ~8.5% respectively as shown in Table 4-8. In the general population, this is ~56.8%.

Table 4-8: Material Access Measure of Association: Income and Age

	Students		Civil Servants		House wives		Overall	
	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig
M.Access * Income	0.490	0.003	0.706	p<0.001	0.085	0.040	0.568	p<0.001
M. Access * Age			0.317	p<0.001	0.327	p<0.001	0.016	0.507

This confirms Pigato's claim that digital divide often follows and reinforces existing inequality and poverty patterns (Pigato, 2001). This seems to agree with the theoretical insights that designers often fail to recognize the access requirements necessary for people with disabilities (RNIB, 2000) and there exist a wide range of disabling conditions that require specific approaches to ICT policy design. Some core issues and barriers of relevance include hardware generally not adaptable, lack of awareness and incorrect assumptions made about the levels of disabled people's achievements and efforts for inclusion through segmentation of services and incoherent initiatives.

4.2.4 Information Involvement : An analysis

The items related to the 'involvement' concept, resulted into two separate factors, renamed 'internet interest' and 'internet confidence' ($\alpha = 0.721$ and $\alpha = 0.813$) respectively.

Table 4-9: Sample Means: Information Involvement Dimension

	Mean		
Factors	Students	Civil Servants	House Wives
Internet Interest	3.55	4.11	3.42
Internet Confidence	3.39	3.8	1.72

The general concepts were operationalized as 'You are more interested in approaching the Internet than other people' and 'your level of confidence in utilizing the Internet is more than other people.' For 'interest' concept, the mean of the scale constructed was 3.55, 4.11 and 3.42 while for internet confidence; the mean was 3.39, 3.80 and 1.72 for students, civil servants and housewives respectively as shown in Table 4-9.

In ANOVA pair wise comparison of means in Table 4-10, though civil servants, students and housewives have interest in Internet, the level for housewives is lower than of civil servants but insignificantly different from that of students. Also, unlike housewives, difference in level of confidence amongst students and civil servants is not significant.

Table 4-10: ANOVA Pair wise Means Comparison

Tukey's Honestly Significant Difference (HSD) Test					
Variable	(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.
Interest	Student	Civil servant	-0.553	0.143	p<0.001
	Student	House wife	0.133	0.143	0.620
	House wife	Civil servant	-0.687	0.143	p<0.001
Confidence	Student	Civil servant	-0.41	0.18	0.062
	Student	House wife	1.67	0.18	p<0.001
	House wife	Civil servant	-2.08	0.18	p<0.001

See Table 4A-7, Table 4A-8 and Table 4A-9 in the Appendix for ANOVA pair wise mean comparison of the factors against the background characteristics of gender, income level and age for the sub samples.

It is indeed true that over twice as many employed people are on-line than there are the unemployed (Booz–Allen & Hamilton 2000) and so eradicating joblessness is another strategy of alleviating digital divide. A significant relationship exists between one's gender and one's interest in internet among the civil servants and hence these background aspects need consideration in efforts to bridge digital divide among the working class. Though there exist no significant difference between gender among students, general population exhibit significantly high difference ($p<0.001$) as in Table 4A-7 between the gender.

As shown in Table 4-11, there exist a significant level of association between civil servants' income level and interest in Internet with a percent variance of 47.1% of Interest explained by variances in income. In overall, 18.9 % of the variance in Interest for the general population is significantly explained by variance in income level. Surprisingly, it's only among housewives that a significant association between age and interest exist.

Table 4-11: Involvement Measure of Association: Income and Age

	Students		Civil Servants		House wives		Overall	
	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig
Interest * Income	0.107	0.216	0.471	p<0.001	0.004	0.662	0.189	0.001
Confidence * Income	0.053	0.390	0.681	p<0.001	0.191	0.001	0.572	p<0.001
Interest * Age			0.114	0.131	0.174	0.031	0.010	0.687
Confidence * Age			0.347	p<0.001	0.284	0.001	0.051	0.060

There is an agreement with the theoretical perspectives that 'involvement' takes place when Internet has a utility value in economic or psychological terms. This could explain the least interest among housewives. A significant number of citizens in developing nations believe ICT is not relevant in their lives and this perception has a socio-economic dimension. Many people still largely associate ICTs with 'economic domain' (Benton, 1998) and so individuals in higher socio-economic categories are more likely to use ICT.

In addition, there exists a significant relationship between one's gender and one's confidence in utilizing the internet in the civil service, and among the general population the difference seems significantly high ($p<0.001$) between (males:3.988, females:2.574). This seems to match the theoretical insights that educational computing is constructed as a 'male' activity during classroom interactions (Culley, 1993). This can diminish participation and enthusiasm amongst girls and affect educational and occupational choices (Beynon, 1993). As well, among civil servants and housewives, income appears to significantly define level of confidence in utilizing the Internet with a percent variance of 68.1% and 19.1% of confidence explained by variances in income. In overall, 57.2% of the variance in confidence for the general population is significantly explained by variance in income level, shown in Table 4-11. Among housewives and civil servants, variance in age

significantly explains 28.4% and 34.7% of the variance in level of confidence while for the general population; age doesn't seem to significantly explain variance in confidence level.

This means that for 'confidence', the AII theory model agreed with theoretical perspectives that data is useless unless people have expertise to transform it into useful information (Heeks et al., 2003). Unlike civil servants and students, housewives have least reasons to utilize the Internet; hence need no technical confidence for digital approach in their daily chores. It is also evident that males have more confidence in approaching technology than females and this confidence diminishes with age. This agrees with the theoretical perspective as noted by Fink and Kenny... '…..the young, often males are most likely to use ICT (Fink & Kenny, 2003). It is therefore a prerequisite to be trained in relevant ICT skills to utilize the internet and improve in work performance. It is important to be motivated and interested in making use of the Internet on the basis of the acquired skills. This factor which is closely related to improving performance in one's work has a considerable effect on the digital divide to all sample groups.

Therefore, need exists to draw up measures to encourage users to have motivation with the view to boosting the utilization of the Internet. The State funded incentives should encourage dissemination of contents of relevance and of interest. This is because it is noted that if the Internet is used more often, the utility value get higher and higher for the users. This implication has a similarity of encouraging web users to take a role as a prosumers (Toffler, 2006). In this context if a user does not have a technical confidence or use for the Internet, as in the case of most housewives then the divide will naturally widen. Hence incorporating ICT in daily chores may be seen as an alternative strategy to resolution of digital divide in the long term (Kuttan and Peters, 2003).

4.2.5 Information Interaction : An analysis

Following factor analysis, most of the items related to 'interaction' concept, appeared to belong to a single factor renamed 'internet literacy'. The general concept operationalized as, 'you have superior skills in utilizing the Internet to other people.' The mean of the scale constructed on the basis of this factor being 3.38, 3.31 and 2.35 for students, civil servants and housewives as shown in Table 4-12.

Table 4-12: Sample Means: Information Interaction Dimension

	Mean		
Factor	Students	Civil Servants	House Wives
Internet Literacy	3.38	3.31	2.35

Table 4-13: ANOVA Pair wise Means Comparison

Tukey's Honestly Significant Difference (HSD) Test					
Variable	(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.
Literacy	Student	Civil servant	0.075	0.095	0.709
	Student	House wife	1.03	0.095	p<0.001
	House wife	Civil servant	-0.955	0.095	p<0.001

See Table 4A-7, Table 4A-8 and Table 4A-9 in the Appendix for ANOVA pair wise mean comparison of the factors against the background characteristics of gender, income level and age for the sub samples.

In ANOVA pair wise mean comparison in Table 4-13, a significant difference exist between housewives and other sub samples but none exist between students and civil servants. This agrees with the theoretical perspectives that higher levels of illiteracy in deprived areas may severely restrict numbers using public access points (DTI, 1999) even

if provided. Lack of computer literacy can compound this problem and also present a barrier to effective mobilization in other contexts.

In addition, unlike civil servants and students who utilize internet in their roles, housewives experience lowest level of internet skills hence the level of interaction with Internet is relatively lower, also explained by their low level of ICT skills.

It was also noted that like digital divide awareness, there exist significant relationship between one's gender and ones' level of internet literacy among the students (males: 3.643, females: 3.278) as shown in Table 4A-7. It is indeed noted that boys use ICTs more than girls, and have more positive perceptions of ICT use and ability (Millard, 1997). Though there exist no significant difference in 'literacy' between males and females in civil service, in the general population the difference seems to be significantly high ($p<0.001$.) There also exists a significant level of association between 'literacy' and 'income' for civil servants, housewives and within the general population as shown in Table 4-14.

Table 4-14: Interaction Measure of Association: Income and Age

	Students		Civil Servants		House wives		Overall	
	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig	Eta^2	Sig
Literacy * Income	0.198	0.084	0.622	p<0.001	0.587	p<0.001	0.446	p<0.001
Literacy * Age			0.468	p<0.001	0.077	0.290	0.095	0.003

The findings in Table 4-14 indicate that, like in the general population, variance in age of civil servants explain 46.8% variance in level of internet literacy. This 'literacy' is also related to level of employment where one gets to acquire ICT-related skills for use in daily chores. In this case, employment is also related to income. The worrying thing about unemployment in Kenya is that it is not only a problem of the uneducated but also the educated (Sakwa, 2006). Closely related is the decline in the real wages in all sectors of the

economy (World Bank, 1995, Kimalu et al, 2002:21) which is also a significant factor which need consideration while drawing up strategies to alleviate the divide.

The literacy rate is evident to be higher among males and the high income groups with significant proportion of students having Internet skills above the average level. This has grounding in the theoretical insights as continued utilization of Internet is significant since no more is it citizens' role simply to consume, the consumer is becoming a creator (Smith et al., 1999) and therefore superior skills are needed to create over and above consuming the existing Internet resources.

In closing, the digital divide policy should be linked to the improved work performance of the Internet users. Until recently digital divide policy has had an emphasis upon supply side of educating people, offering ICT training and giving devices of ICT to policy targets.

4.3 Path Analysis and Causal Correlation

It is noted that the understanding of dynamic characteristics of information society lead to two major undertakings, namely; theoretical strive for determining what matters, and determining how much what matters matters (Grigorovici, et al., 2004d). To this end, path analysis for each sub-sample was undertaken.

The path influences of 'material access', 'internet interest', 'internet confidence' and 'internet literacy' on digital divide were explored against the background influences of age, gender, income and educational levels for each sub-sample in an attempt to link the empirical model with theoretical model. The direction of causality in digital divide and independent variables with the moderating factors are as shown in Figure **4-3**.

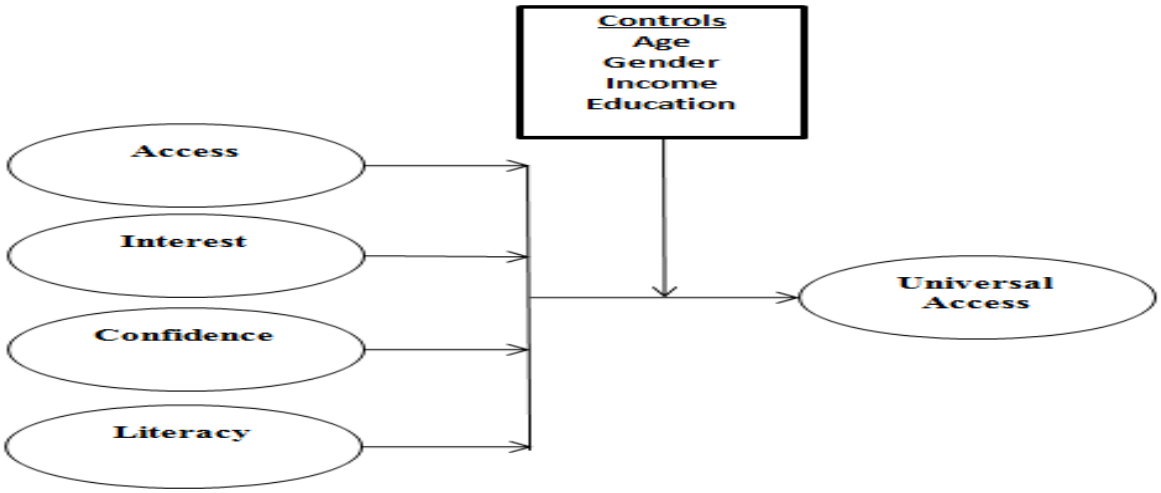

Figure 4-2: Causal Linkages in Digital Divide

4.3.1 Sample: - Students

The influence coefficients of significance are shown in Table 4-15 and summarized in path diagram in Figure **4-4**.

Table 4-15: Students: Model Coefficients

	M.Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	Model P-value	Adjusted R^2
	0.717	0.196	0.163	0.233	<0.001	58.0%
P-value	<0.001	0.064	0.160	0.071		

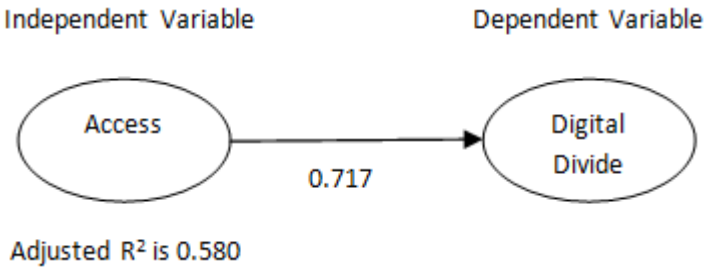

Figure 4-3: Students: Path diagram summary

First, the AII approach suggested in this research has a considerable application as a theoretic model for bridging the digital divide and as far as the subject of the research is concerned, it is seen that the AII model has statistical fitness with an adjusted R^2 = 58.0%.

Equation 4-1: Students: Standardized Regression Model

$\psi = 0.717\alpha_1 + 0.196\alpha_2 + 0.163\alpha_3 + 0.233\alpha_4$ where ψ -Universal Access, α_1 -Material Access, α_2 -Interest, α_3 -Confidence and α_4 - Literacy.

The 'material access', mainly influenced by economic status, is an important factor for resolving digital divide among students, but as advanced in literature, this is unable to play a role as a core variable to achieve internet ubiquity. Though, it is a prerequisite to be equipped with ICT related training to be able to utilize the Internet, it is equally important to have interest to make use of the internet based on ICT literacy and technical confidence for digital approach.

Table 4-16: Students: AII Model and Moderating Coefficients

			Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	R^2	P-value
Overall			**0.598**	0.051	**0.196**	**0.144**	79.9%	**<0.001**
		Sig	**<0.001**	0.234	**0.004**	**0.020**		
Age	19-30 yrs.		**-0.797**	0.064	0.188	0.097	71.1%	
		Sig	**<0.001**	0.498	0.072	0.386		
Gender	Females		0.828	0.104	0.089	0.024	81.6%	
	P-value		—	0.271	0.355	0.816		
	Males		—	**0.913**	**2.713**	**2.781**	100.0%	
	P-value		—	**<0.001**	**<0.001**	**<0.001**		
Income	0-5000 Ksh.		**1.064**	**0.401**	—	**0.556**	100.0%	
		Sig	**<0.001**	**<0.001**	—	**<0.001**		
Education	Secondary		—	**0.593**	**0.297**	**0.703**	100.0%	
		Sig	—	**<0.001**	**<0.001**	**<0.001**		
	Diploma		—	**0.620**	**0.303**	**0.611**	100.0%	
		Sig	—	**<0.001**	**<0.001**	**<0.001**		
	Bachelor		**0.706**	**0.770**	**0.837**	**0.898**	100.0%	
		Sig	**<0.001**	**<0.001**	**<0.001**	**<0.001**		

In this sub sample, aspect of greatest significance in the divide resolution process is the material access as students will naturally develop technical confidence and interest to apply the ICT training in their daily chores. Table 4-16 shows the influences of the moderating factors on the theory model for the subsample of students.

Comparing the overall population *(0.598)* with subsample of students, it is noted that age *(0.797),* level of education *(-0.706)* and income *(1.064)* are significant aspect influences of access among students while for 'interest', it is gender, education and income levels. It's also interesting to note that though age is a factor of influence, it is not significant in

defining the level of confidence and ICT literacy among the students. Of recent, the economies of the world have been changing from industrial to knowledge based. ICTs are the major driving forces behind knowledge based societies of the new world era.

As Kenya becomes a knowledge-based society, there will be a greater demand for lifelong ICT education. With these developments, Kenya needs national ICT learning policy integrated into education policy. These will increase penetration of ICTs among students, irrespective of age, sex, race or socio-economic status. Besides, without access to ICTs, with an understanding of its significance in socio-economic gain, female students in Kenya will be marginalized hence gender is an issue of significance in this resolution process. Thus a concerted effort to check these imbalances is required. Hitherto without deliberate action, women may be left out of the push to narrow the digital divide.

4.3.2 Sample: - Civil Servants

It is evident that AII policy model has a considerable practical application as a theory model among the working class in Kenya. The influence coefficients are as shown in Table 4-17 with research results of significant variable summarized in Figure 4-5.

Table 4-17: Civil Servants: Model Coefficients

	Access (β1)	**Interest (β2)**	**Confidence (β3)**	**Literacy (β4)**	**Model P-value**	**Adjusted R^2**
	0.161	0.089	0.326	0.421	<0.001	61.2%
P-value	0.472	0.332	0.106	**0.001**		

It has a fit statistic with an adjusted R^2 = 61.2 %. The material access, internet interest and confidence variables in this sub-sample, which are significantly influenced by their economic status, education level and gender, are important factors but are unable to play a

significant role as a core variable in ubiquitous situation in the absence of internet literacy. Table 4-16 shows background characteristics influence coefficients on latent variables.

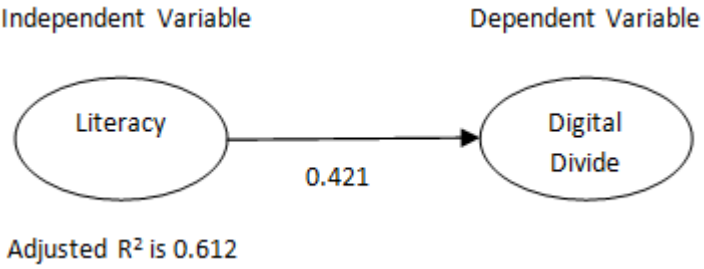

Figure 4-4: Civil servants: Path diagram summary

With the emergence of ubiquitous age in public service, 'access' is easy and natural but it is a prerequisite to have ICT related training to utilize the internet. In the light of empirical evidence above, need exists to draw up measures to motivate civil servants with a view to boosting the utilization of the internet. The factors of greatest impact being literacy and technical confidence. These incentives have to be associated with age, gender, education and their income level. For instance, 'The Adults in Computers' among other donor sponsored initiatives currently emphasize on 'access' projects like the distribution of ICT accessories and contents aimed at the handicapped and the senior citizens (CFSK, 2006). Though this is persuasive, to an average working class Kenyan, 'interaction' policy may be needed through national ICT learning policy. The literacy in itself is significantly dependent on one's level of education, age and income level as shown in Table 4-18 and Table 4-19. Thus, the regression model with a model fitness of 61.2% showing relative weights of the factors is shown in Equation **4-2**.

Equation 4-2: Civil Servants: Standardized Regression Model

$\psi = 0.161\alpha_1 + 0.089\alpha_2 + 0.326\alpha_3 + 0.421\alpha_4$ where ψ -Universal Access, α_1-Material Access, α_2 -Interest, α_3 -Confidence and α_4 - Literacy.

Table 4-18: Civil Servants: AII Model and Moderating Coefficients

				Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	R^2	Adjusted R^2
Overall				0.598	0.051	0.196	0.144	79.9%	79.4%
			Sig	**<0.001**	0.234	0.004	0.020		
Age	19-30 yrs.			—	—	0.720	0.303	100.0%	100.0%
			Sig	—	—	**<0.001**	**<0.001**		
	31-42 yrs.			0.715	0.347	0.120	0.198	55.5%	46.1%
			Sig	0.069	0.094	0.703	0.382		
	43-54 yrs.			0.347	1.616	2.213	1.069	100.0%	100.0%
			Sig	**<0.001**	**<0.001**	**<0.001**	**<0.001**		
	Over 55 yrs.			—	—	—	1.000	100.0%	100.0%
			Sig	—	—	—	**<0.001**		
Gender	Civil Servants	Females		0.502	0.324	0.963	0.350	91.8%	89.8%
			Sig	0.063	0.001	**<0.001**	0.012		
		Males		0.650	0.097	0.035	0.311	80.8%	65.2%
			Sig	0.038	0.643	0.858	0.099		

At this point clear difference need to be made between four kinds of access “mental access”, “material access”, “skills access”, and “usage access”. The empirical results propose a shift to the “mental access” and “skills access”. Table 4-19 gives control coefficient for income and education level for the sub-sample of civil servants.

Table 4-19: Civil Servants: AII Model and Moderating Coefficients

	KSh		Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	R^2	Adj. R^2
Income	15001-20000		1.132	–	–	0.446	100.0%	100.0%
		Sig	<**0.001**	–	–	<**0.001**		
	20001-30000		–	–	–	1.000	100.0%	100.0%
		Sig	–	–	–	<**0.001**		
	35001-40000		0.597	0.063	–	1.247	100.0%	100.0%
		Sig	<**0.001**	<**0.001**	–	<**0.001**		
	Over 40000		1.344	1.156	1.349	1.061	64.2%	56.2%
		Sig	<**0.001**	0.002	<**0.001**	0.001		
Education	Diploma		0.357	0.432	0.719	0.392	90.2%	87.6%
		Sig	0.116	0.007	0.005	0.016		
	Bachelor		0.491	1.667	0.687	0.375	98.1%	97.3%
		Sig	0.007	<**0.001**	0.002	0.010		
	Masters		16.848	2.772	17.793	1.791	100.0%	100.0%
		Sig	<**0.001**	<**0.001**	<**0.001**	<**0.001**		
	PhD		–	–	–	1.000	100.0%	100.0%
		Sig	–	–	–	<**0.001**		

Therefore, it is evident that any policy developed to aid in bridging the digital divide among working class will only be of greatest impact if age and educational level of policy targets are considered. This has some consistency with the theoretical insights as continued utilization of internet is significant in order to experience the utility. Smith says that …..… *the consumer is becoming a creator* (Smith et al., 1999) hence the need for superior ICT literacy skills. The interest in ICT related skill acquisition seem to dim with age.

4.3.3 Sample: - Housewives

The influence coefficients are as shown in Table 4-20. The research results of significant variables summarized in path diagram in Figure 4-6.

Table 4-20: Housewives: Model Coefficients

	Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	Model P-value	Adjusted R^2
	0.386	0.432	0.542	0.061	<0.001	66.4%
P-value	**0.002**	**0.003**	**<0.001**	0.515		

Table 4-15 shows background characteristics influence coefficients on latent variables. Following empirical exploration it is evident that AII policy model proposed in this research has the practical application as a theoretic model for bridging the digital divide among the vulnerable class.

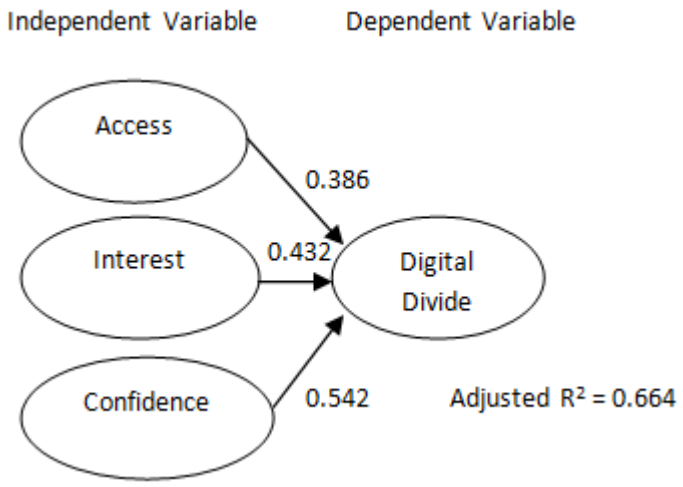

Figure 4-5: Housewives: Path diagram summary

Though, the model fitness is statistically significant with an adjusted R^2 = 0.664, the technical confidence variable emerges as having the greatest impact for persons of this profile. It is evident that 'access', which is significantly influenced by economic status and age of possible users, is unable to play a role alone to attain internet ubiquity. Though the

major facets of influence for this class are access, interest, literacy and confidence, the significant one are technical confidence (0.542), internet interest (0.432) and access (0.386). This advances the premise that mere technology deployment is not solution enough to alleviate digital divide. Table 4-21 presents moderating coefficients for the sub sample of housewives with regards to the proposed AII theory model.

Table 4-21: Housewives: AII Model and Moderating Coefficients

			Access (β1)	Interest (β2)	Confidence (β3)	Literacy (β4)	R^2	Adj. R^2
Overall			0.598	0.051	0.196	0.144	79.9%	79.4%
		Sig	**<0.001**	0.234	0.004	0.020		
Age	19-30 yrs.		0.278	0.086	0.997	0.195	87.0%	83.3%
		Sig	0.089	0.529	<0.001	0.108		
	31-42 yrs.		–	1.824	2.806	0.375	100.0%	100.0%
		Sig	–	**<0.001**	**<0.001**	**<0.001**		
	43-54 yrs.		–	0.101	–	0.974	87.0%	83.3%
		Sig	–	**<0.001**	–	**<0.001**		
	Over 55 yrs.		1.380	–	–	0.643	100.0%	100.0%
		Sig	**<0.001**	–	–	**<0.001**		
Gender	Females		0.386	0.432	0.542	0.061	83.2%	69.1%
		Sig	0.002	0.003	–	0.515		
Income	0-5000		0.235	0.423	0.630	0.156	72.9%	69.8%
		Sig	0.114	0.003	p<0.001	0.107		
Education	Secondary		0.533	0.312	0.509	0.042	84.9%	83.0%
		Sig	**<0.001**	0.008	**<0.001**	0.590		
	Diploma		–	0.620	0.303	0.611	100.0%	100.0%
		Sig	–	**<0.001**	**<0.001**	**<0.001**		
	Bachelor		0.607	0.580	0.405	0.677	100.0%	100.0%
		Sig	**<0.001**	**<0.001**	**<0.001**	**<0.001**		

Therefore, ICT policies need to be designed in ways that encourage digital indulgence and motivate possible users to develop interest towards digital approach. The education level is

a significant aspect of influence in AII digital resolution process for the sub sample of housewives but for the persons with similar profile as housewives, 'technical confidence' and 'interest' should be accorded priority in efforts to bridge the divide. These empirical findings agree with the theoretical insights that besides 'hard factors', the usage of internet is affected by 'soft factors', such as individuals' personal attitudes. These insights have important implications for the way in which governments should attempt to stimulate usage among the vulnerable class. Therefore, it is not enough to ensure that the infrastructure is accessible; individuals have to be motivated to develop an interest in the ICT infrastructure. For this class, digital approach confidence is dependent on income and education levels. It is a prerequisite to be equipped with ICT training to be able to utilize the internet but it is also important to have interest to make use of the internet based on ICT skills. The ICT literacy remains a challenge as this class of persons still grapple with high costs for possible access. The associated regression model for this sub sample is provided in Equation 4-3.

Equation 4-3: Housewives: Standardized Regression Model

$\psi = 0.386\alpha_1 + 0.432\alpha_2 + 0.542\alpha_3 + 0.061\alpha_4$ where ψ -Universal Access, α_1 -Material Access, α_2 -Interest, α_3 -Confidence and α_4 - Literacy.

It is therefore noteworthy to conclude that policymakers need recognize a range of individual level attributes indirectly influencing resolution of digital divide. These include age, income and education level. The policies need designed to address this interplay and balance of factors. Integration of ICT in adult education policy comes up as being of great importance in equipping people with the necessary skills and attitudes for taking advantage

of ICT. For this particular group, though access, literacy and interest are of importance, policy of greatest impact need skewed towards building technical confidence.

4.3.4 Sample: - Overall

In considering the discussions in the previous sections, it can therefore be deduced that AII perspective suggested in this research has the practical application as a theoretic model for bridging the digital divide in Kenya. The influence coefficients are as shown in Table 4-22.

Table 4-22: Overall: Model Coefficients

	Access (β1)	**Interest (β2)**	**Confidence (β3)**	**Literacy (β4)**	**Model P-value**	**Adjusted R^2**
	0.598	0.051	0.196	0.144	<0.001	79.4%
P-value	**<0.001**	0.234	**0.004**	**0.020**		

This model with a fitness of an adjusted R^2 = 79.4% has a considerable application as far as the subjects of the research - students, civil servants and housewives- are concerned. The factor 'access' being the most significant factor and also one with the greatest impact but unable to achieve ubiquity without the factors of interest, confidence and literacy as shown in the Equation 4-4.

Equation 4-4: Overall: Standardized Regression Model

$\psi = 0.598\alpha_1 + 0.051\alpha_2 + 0.196\alpha_3 + 0.144\alpha_4$ where ψ -Universal Access, α_1 -Material Access, α_2 -Interest, α_3 -Confidence and α_4 - Literacy.

Figure 4-7 shows a summary of research results with variables of significance:-

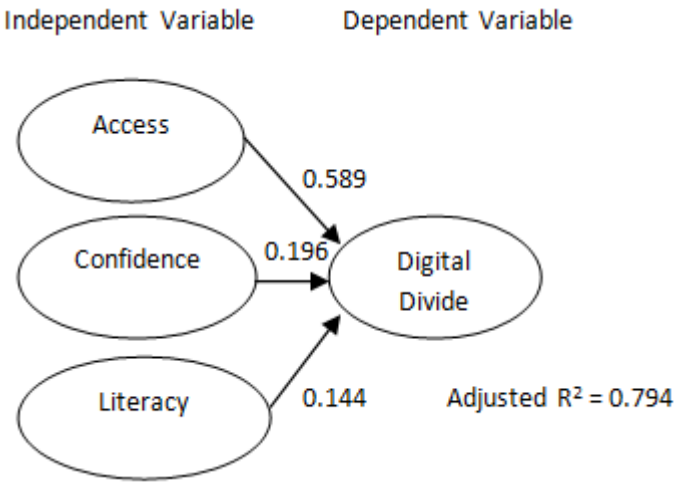

Figure 4-6: Overall: Path diagram summary

Though material access variable (0.598) remains of greatest impact in bridging the digital divide within the general population, other factors of significance as technical confidence (0.196) and ICT related literacy (0.144) exist. Besides, though the regression model of fitness for the general population has an Adjusted R^2 =79.4%, access alone is unable to play a role as a core variable in ubiquitous situation.

Therefore need exists to focus on 'involvement' and 'interaction' concepts to draw up motivational measures with a view to boosting the utilization of internet based on acquired ICT trainings. Incentives should be provided and these should be associated with a policy targets in digital divide resolution (Kuttan & Peters, 2003). In addition, it is evident that if the internet is used more often, the utility values get higher. Therefore, it is significant to continue to utilize the internet in daily chores to experience the utility. This implication has similarity to leading web users to take a role as a prosumer (Toffler, 2006). Even though an access opportunity to internet may be provided naturally, it equally important is to have interest in the infrastructure.

4.4 Summary

The assessment of the direct and indirect influences of the major factors of digital divide against the background characteristics reveals the causality as depicted in theory. This confirms that digital divide causes are multifarious. Levels of usage are influenced not only by access to the ICT infrastructure, but also by softer factors of age, income, education and geography. It is therefore proposed in this research that for the success of the policy initiatives, considerations should be given to existing socio-economic and political conditions. Connor McCaffery (2003) define them as socioeconomic factors, life factors as age, gender, and finally socio-personal factors which include attitudinal aspects.

In contrast, policymakers also need to be aware of the possible unintended consequences of policies designed. Connor McCaffery gives an example. In the town of Ennis in Ireland, funds were invested in internet infrastructure; attention was focused on the broadband roll out but little to stimulating the use. The scheme was taken advantage of primarily by the well off. This further widened the gap and therefore the policy even worsened the digital divide. Therefore creating relevant and motivational content can lead to greater benefits as ICT applications introduced speak directly and personally to the individuals concerned. This form of killer applications may thus become indispensable for the users.

Lastly, the results of these causal correlations point to the fact that digital divide is a serious issue confronting the Kenyan society and at the most basic level it seems to arise from a lack of appropriate access for certain sections of society to digital infrastructure but the underlying causes are more complex. For the vulnerable class, encouraging the growth of native-language internet hosts, dissemination of relevant content, reduction of tariffs on ICT products, further deregulation of telecom services would help.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5.1 Introduction

This chapter outlines the summary of major underpinnings, conclusions and recommendations for this research thesis.

5.2 Summary

This study set out to evaluate AII policy model and infer policy and strategies to bridge digital divide in Kenya. As laid out in Chapter One, the research also aimed at examining the main factors that impact internet adoption in Kenya in the context of Korean AII perspective.

In Kenya, as in other developing nations, reaching the poor and realizing the potential of ICTs for human development is a challenge but a policy endeavor worth attempting as argued in Chapter Two. As it emerged from the review of literature, though liberalization of ICT sector in Kenya in the last few years has led to a rapid growth in technology deployment, low-cost and accessible internet infrastructures are necessary but insufficient conditions to attain information society for all at all layers of the society. Besides 'hard factors', the usage of internet is affected by 'soft factors' as individuals' personal attitudes.

The research design was a survey that sampled 210 respondents in Nairobi consisting of three groups namely: civil servants, university students and housewives. The survey was carried out using a questionnaire and data analysis was done using SPSS to explore and identify predicting factors . The findings of this study were placed in the perspective

supporting the AII model which was used in advancing the theoretical understanding of digital divide in Kenya. The research results may now be summarized.

First, information access in the context of AII policy model is a determining factor in bridging the digital divide in Kenya. This variable, which is related to the technological access to the internet, is an important factor for the digital divide, but is unable to play a role as a core variable in a ubiquitous situation.

Second, information involvement in the context of AII policy model is a determining factor in bridging the digital divide in Kenya. In general, it is a necessary prerequisite to have technical capability for internet utilization since motivation and interest is largely based on the capability.

Third, information interaction in the context of AII policy model is a determining factor in bridging the digital divide in Kenya. It is necessary to regard the internet as a required means to achieving and conducting daily chores.

5.3 Conclusions

At onset it was logical to anticipate that the theoretical dimensions would result into empirical concepts. Though the three dimensions did results into four factors in total, there is considerable evidence that the socio-economic and political sectors affect the capacity and actual level of ICT usage.

In this research several interesting conclusions can be drawn – some expected and some un-expected. First, there is considerable evidence to conclude that poverty and lack of information are common-bed partners. Therefore, the greatest power of digital information technologies is the ability to overcome geographic, time and societal barriers as seen for

the samples studied. Different speeds in uptake of the technologies will lead to an increase or decrease of gaps between different economies -socially, economically, politically or geographically.

Second, there is confirmed significance that income level explains the gap in internet use. In certain instances the effect of other factors rival it, namely, gender, educational level and age. Therefore, lack of consideration for these socio-cultural elements in regulations can lead to the universalization of the universal service problem.

Third, the quality of regulation is of great importance. The differences in ICT strategy and regulatory quality generally account for large portions of the gaps in technology use. Indeed, this is quite consistent with existing literature and thus, it remains vital to continue to identify the ever changing users' socio-economic situations and business models in order to maximize the economic and social benefits. Though public policies and opinions have been preoccupied with the material access, the researcher proposes need for gradual shift to the skills and usage access.

Last, but central in the policy debate is the question of the actual substance of the digital divide. Like many policy controversies, this core query has polarized the players in into different camps. That is, those that feel the digital gap is a legitimate crisis and those that think the problem has been overblown out of proportion. From the research, the phenomenon is a reality and not a hype created by mass media or politicians. Therefore more relevant and suitable policy alternatives are required in Kenya to abridge it.

Based on results from regression models and causality tree presented in Chapter Four, there is evidence based conclusion that digital divide exists at four levels, namely, access, e-interest, e-confidence and e-skills in the Kenyan population. From this research, a

representative of the most digitally deprived segment of the population could be described as an unemployed female over 60 years of age, living in a rural setting, with a monthly income less than Ksh.5000, without formal education, who has no access to a personal computer, PC or internet and has no basic PC or internet skills.

5.4 Recommendations

The AII approach suggested in this research has practical significance and is recommended as a theoretical model for the Kenyan scenario. Using empirical and qualitative methodologies attempts can be made to better Computer for Schools Kenya (CFSK), Access@schools program, Notebook program and The One Laptop per Child initiatives.

In the 'e-Government strategy' paper of 2004 and 'National ICT Policy' of 2009, providing guidelines for transformation of Kenya to 'result' into a digital society, digital divide concept is defined from perspective of 'access' and 'competence' (UNDP, 2009). The concepts of 'competence' and 'results' have some abstractness and should be defined in the light of important facets. These facets should be appropriate in explaining the multi-staged digital divide resolution process as evident in this research.

In addition, the Kenya Communication regulation of 2009 on Universal Access and Service together with a set of Kenya Communication Amendment Act Number 1, 2009 define 'un-served areas' as 'geographic areas where no designated level of universal access is currently available' (KCA, 2009). This should consider socio-economic and political peculiarities across geographies and focus on social benefits of a connection rather than on increasing the number of internet connections *per se*. This, as it is now, has disoriented CCK's universal service policy and beats the purpose of proposed Universal Service Fund, positioning Kenya at a competitive disadvantage in the global information economy.

5.5 Further research

Finally, the generic structure of this thesis can be extended to explore future lines of this research. The first one would be to improve the fit of the model through refinement using a larger geographical unit for greater predictive power and model stability. In general, any improvement in data would most likely improve the fit. The second would be to test similar perspectives in the provision of other public utilities as education. The third and fourth ones have been developed under the names 'knowledge economy' or vertical expansion of this work to comprehensively explore applications of information in all aspects of life and 'network theory' or horizontal expansion of this research to gather all collateral and synergic effects in appreciating the notion of information-for-all.

"*Now a debate has been born. The thesis is **Democratic Socialism**. The antithesis is free-market capitalism. The Democrats have posed the challenge. It is now up to the Republicans to … fight along these lines."--**Dick Morris.***

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APPENDICES

Appendix I: Questionnaire

DATA COLLECTION QUESTIONNAIRE

Dear Sir / Madam,

The researcher is Mr. Kennedy Okong'o, a student of Master of Science in ICT Policy & Regulation at Jomo Kenyatta University of Agriculture & Technology, Nairobi, Kenya.

Your responses to the questionnaire will be used in a research aimed at shaping policy & regulatory frameworks in ICT sector for human and socio-economic progress in Kenya.

Kindly note that your participation in this research project is voluntary and your identity will remain confidential. In case of need for clarification about any aspect of this questionnaire you can reach me on **Tel: - +254 773 494 950**. Thank you in advance.

Kennedy Okong'o

Registration Number: **HD 314-0453 / 2009**

PART 1 – GENERAL INFORMATION

1. Gender Male ☐ Female ☐
2. Date of Birth 19……..
3. Highest level of education

Primary ☐ Secondary ☐ Diploma ☐ Bachelor ☐ Masters ☐

PhD ☐ Others.....

4. Student ☐ Civil Servant ☐ Housewife ☐
5. Occupation ……
6. Monthly Income Level (KSh)

0-5,000 ☐ 5,000-10,000 ☐ 10,000-15,000 ☐ 15,000-20,000 ☐

20,000-30,000 ☐ 30,000-35,000 ☐ 35,000-40,000 ☐ Over 40,000 ☐

For **Part 2-5** rate the answers using the scale given below;

Strong Objection (SO), Objection (O), Not sure (N), Affirmation (A), Strong Affirmation (SA)

PART 2 – DIGITAL DIVIDE

7. You use a computer in accessing the Internet more than your peers;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

8. Your frequency of access to the Internet is less than other people;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

9. You spend more time on the Internet than other people;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

10. You have less difficulties compared to your peers in making use of the Internet;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

11. You experience more difficulty than other people in accessing a networked computer ;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

12. You find it more convinient than other people to use a cell phone to access the Internet;

SO ☐ **O** ☐ **N** ☐ **A** ☐ **SA** ☐

PART 3 –INFORMATION ACCESS

13. You have greater access to Internet at home compared to other people;

SO □ **O** □ **N** □ **A** □ **SA** □

14. You are better trained than other people to log-in to the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

15. You have fairer access than other people to the the Internet ;

SO □ **O** □ **N** □ **A** □ **SA** □

16. You have more difficulties in logging-in to Internet compared to other people;

SO □ **O** □ **N** □ **A** □ **SA** □

17. You have higher economic capability than other people to purchase the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

18. Due to regional or locational factors ,you experience more difficulties than other people in accessing the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

PART 4 –INFORMATION INVOLVEMENT

19. You have more interest in the Internet than other people;

SO □ **O** □ **N** □ **A** □ **SA** □

20. You have more fun than other people in utilising the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

21. You have higher technical confidence than other people in utilizing the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

22. You have lower capabilities than other people to utilize the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

23. You experience greater motivation than other people to utilize the Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

24. You can make better use of the Internet than other people in doing your businesses;

SO □ **O** □ **N** □ **A** □ **SA** □

PART 5 –INFORMATION INTERACTION

25. You have lower capabilities than other people in solving problems via Internet;

SO □ **O** □ **N** □ **A** □ **SA** □

26. You experience greater productivity at work by utilizing the Internet than other people;

SO □ **O** □ **N** □ **A** □ **SA** □

27. Your work has greater reliance on the Internet than other people;

SO □ **O** □ **N** □ **A** □ **SA** □

28. Your work is more dependent on your Internet skills than other people;

SO □ **O** □ **N** □ **A** □ **SA** □

29. You have less Internet -related trainings than other people;

SO □ **O** □ **N** □ **A** □ **SA** □

30. You have higher level of use of the Internet skills, not only for games but for economically productive reasons than other people;

SO □ O □ N □ A □ SA □

PART 6 – ICT POLICY, REGULATION AND STRATEGIES

31. You are aware of the existence of National ICT Policy for Kenya;

Yes □ No □

32. You have been involved in policy debates regarding telecommunications and / or ICT in Kenya.

Yes □ No □

33. Briefly describe the nature of your involvement, if any…….

34. In your opinion, what is still outstanding, if any in ICT policy and implementation in Kenya……..

35. Are you aware of any ICT project that you feel is a particularly:

a) good example ……
b) bad example…….of the way in which ICTs are used; and especially for bridging the digital divide in Kenya.

36. Are there any issues not raised in this questionnaire that you would like to comment on, in regards to ICT policy & implementation in Kenya?

……..

Appendix II: Sample Characteristics

Table 4A-1: Attribute: Age

	Public Servants %		Housewives %	Student %		Overall %
Age Cluster	Female	Male		Female	Male	
15-24	0.0	0.0	8.0	91.7	50.0	29.3
25-34	45.5	35.7	36.0	8.3	21.4	29.3
35-44	22.7	28.6	24.0	0.0	0.0	16.7
45-54	31.8	17.9	26.0	0.0	0.0	16.7
None	0.0	0.0	0.0	0.0	28.6	2.7
> 52	0.0	17.9	6.0	0.0	0.0	5.3
Grand Total	100	100	100	100	100	100

Table 4A-2: Attribute: Education Level

	Public Servants %		Housewives %	Student %		
Education Level	Female	Male	Female	Female	Male	Overall %
Bachelor	36.4	21.4	6.0	36.1	50.0	24.7
Diploma	54.5	28.6	0.0	19.4	50.0	22.7
Masters	9.1	32.1	0.0	0.0	0.0	7.3
PhD	0.0	17.9	0.0	0.0	0.0	3.3
Primary	0.0	0.0	18.0	8.3	0.0	8.0
Secondary	0.0	0.0	76.0	36.1	0.0	34.0
Total	100	100	100	100	100	100

Table 4A-3: Attribute: Income Level

	Civil Servants %		Housewives %	Student %	
Income Level / KSh	Female	Male		Female	Male
0 - 5,000	100	0	80	46	54
15,001 - 20,000	57	43	0	0	0
20,001 - 30,000	40	60	0	0	0
30,001 - 35,000	0	100	0	0	0
35,001 - 40,000	60	40	0	0	0
5,001 - 10,000	0	0	20	0	0
Over 40,000	30	70	0	0	0
Not Indicated	0	0	0	88	12
Total	44	56	100	72	28

Appendix III: Factor Analysis

Table 4A-4: Exploratory Factor Analysis Components[a]

	Component Matrix
	Universal Access
Use Computer More	0.923
Access Internet Less	0.922
More difficulties with networked PCs	0.812
Spend more Time In Internet	0.707
Easy with Internet Mobile	0.618
Less Difficulties with Internet	0.460
Cronbach's Alpha	0.840
	Material Access
More difficulties in logging-in to Internet	0.877
Better Internet Training	0.794
More difficulties due to Regional Factors	0.789
Higher Economic Capability	0.664
Fairer Internet Access	0.664
Greater home Internet Access	0.652
Cronbach's Alpha	0.839
	Internet Interest
Greater Motivation	0.827
More Interest	0.802
Better Use	0.779
Cronbach's Alpha	0.721
	Internet Confidence
Lower Capabilities	0.918
Higher Technical Confidence	0.918
Cronbach's Alpha	0.813
	Internet Literacy
Use for economically productive reasons	0.934
Less internet-related lessons	0.910
Work more dependent	0.880
Lower capabilities in solving problems	0.878
Cronbach's Alpha	0.894

[a]The following principles had been observed in the factor analyses. For admission of a factor, an item had to meet the following criteria:-

- ✓ An item had to clearly belong to one factor without high loadings onto other factors and factor loading had to be .30 and above.
- ✓ Eigen value of a factor must be at least 1 and for more interpretable results, oblique rotation was applied when two or more factors correlated at more than .30
- ✓ Communality of at least .20 was observed and R Square .40
- ✓ Threshold value of .60 was set for Cronbach's Alpha value for each factor.

Table 4A-5: Factors' Eigen and Percent Explained Variances

Factor	Eigen	% Explained Variance
Universal Access	3.45	57.57
Material Access	3.33	55.47
Internet Interest	1.93	64.47
Internet Confidence	1.69	84.29
Internet Literacy	3.25	81.15

Table 4A-6: Factor and associated communalities

Universal Access Factor	Initial	Extraction
Use Computer More	1	0.851
Access Internet Less	1	0.851
Spend more Time in Internet	1	0.500
Less Difficulties with Internet	1	0.211
More difficulties with Networked PCs	1	0.659
Easy with Internet Mobile	1	0.382

Material Access Factor		
Greater home Internet Access	1	0.425
Better Internet Training	1	0.631
Fairer Internet Access	1	0.440
More difficulties in Logging-in to Internet	1	0.770
Higher Economic Capability	1	0.440
More difficulties due to Regional Factors	1	0.622
Internet Interest Factor		
More interest	1	0.644
greater motivation	1	0.684
Better use	1	0.607
Internet Confidence Factor		
Higher technical confidence	1	0.843
Lower capabilities	1	0.843
Internet Literacy Factor		
Lower capabilities in solving problems	1	0.771
Work more dependent	1	0.774
Less internet-related lessons	1	0.828
Use for economically productive reasons	1	0.873

Table 4A-7: Gender: ANOVA Mean Comparison for Factors

AII Theory Factors and Gender							
Category	Gender		Universal Access	Material Access	Interest	Confidence	Literacy
Student	F	Mean	3.336	3.116	3.537	3.375	3.278
		N	36	36	36	36	36
		Std. Deviation	0.581	0.738	0.582	1.045	0.536
	M	Mean	2.94	3.393	3.595	3.429	3.643
		N	14	14	14	14	14
		Std. Deviation	0.297	0.25	0.542	0.805	0.413
Sig			**0.020**	**0.178**	**0.748**	**0.864**	**0.026**
Civil Servant	F	Mean	3.5	3.402	3.758	3.205	3.205
		N	22	22	22	22	22
		Std. Deviation	0.749	0.846	0.536	1.202	0.581
	M	Mean	3.786	4.071	4.381	4.268	3.384
		N	28	28	28	28	28
		Std. Deviation	0.829	0.383	0.371	0.776	0.599
Sig			**0.213**	**p<0.001**	**p<0.001**	**p<0.001**	**0.292**
House wife	F	Mean	1.923	2.053	3.42	1.72	2.35
		N	50	50	50	50	50
		Std. Deviation	0.487	0.658	0.957	0.497	0.214
Total	Female	Mean	2.715	2.682	3.528	2.574	2.833
		N	108	108	108	108	108
		Std. Deviation	0.937	0.934	0.776	1.18	0.621
	Male	Mean	3.504	3.845	4.119	3.988	3.47
		N	42	42	42	42	42
		Std. Deviation	0.802	0.471	0.569	0.873	0.553
Sig			**p<0.001**	**p<0.001**	**p<0.001**	**p<0.001**	**p<0.001**

Table 4A-8: Income Level: ANOVA Mean Comparison for Factors

AII Theory Factors and Income Level						
Income		Universal Access	Material Access	Interest	Confidence	Literacy
0 - 5,000	Mean	2.190	2.324	3.518	2.027	2.563
	N	56	56	56	56	56
	Std. Deviation	0.748	0.892	0.887	1.002	0.588
5,001 - 10,000	Mean	2.346	2.564	3.462	2.577	2.981
	N	13	13	13	13	13
	Std. Deviation	0.459	0.525	1.023	0.976	0.590
15,001 - 20,000	Mean	3.143	3.619	4.000	3.786	2.821
	N	7	7	7	7	7
	Std. Deviation	0.495	0.343	p<0.001	1.220	0.572
20,001 - 30,000	Mean	2.733	3.233	4.067	2.600	2.650
	N	5	5	5	5	5
	Std. Deviation	0.091	0.822	0.365	0.548	0.137
30,001 - 35,000	Mean	4.833	4.667	5.000	4.500	3.750
	N	2	2	2	2	2
	Std. Deviation	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
35,001 - 40,000	Mean	3.800	3.767	3.500	3.650	3.350
	N	10	10	10	10	10
	Std. Deviation	0.582	0.362	0.451	0.709	0.459
Over 40,000	Mean	4.051	4.123	4.261	4.435	3.674
	N	23	23	23	23	23
	Std. Deviation	0.583	0.345	0.492	0.460	0.341
Total	Mean	2.842	2.990	3.736	2.879	2.938
	N	116	116	116	116	116
	Std. Deviation	1.037	1.045	0.825	1.321	0.683

Table 4A-9: Age: ANOVA Mean Comparison for Factors[a]

Sample	Age	Statistics	U. Access	M.Access	Interest	Confidence	Literacy
Student	1	Mean	3.288	3.181	3.601	3.337	3.326
		N	46	46	46	46	46
		Std.Dev	0.522	0.676	0.565	1	0.515
Civil servant	1	Mean	3.214	3.071	4.286	3	2.893
		N	7	7	7	7	7
		Std.Dev	0.989	1.158	0.356	1.871	0.675
	2	Mean	3.813	3.938	3.944	4.125	3.365
		N	24	24	24	24	24
		Std.Dev	0.726	0.481	0.642	0.811	0.516
	3	Mean	4.139	4.167	4.361	4.333	3.833
		N	12	12	12	12	12
		Std.Dev	0.517	0.246	0.437	0.444	0.123
	4	Mean	2.762	3.262	4.048	2.571	2.607
		N	7	7	7	7	7
		Std.Dev	0.089	0.673	0.3	0.45	0.134
House wife	1	Mean	2.351	2.254	3.895	1.763	2.421
		N	19	19	19	19	19
		Std.Dev	0.214	0.568	0.417	0.386	0.205
	2	Mean	1.364	1.439	2.909	1.591	2.273
		N	11	11	11	11	11
		Std.Dev	0.234	0.291	1.136	0.437	0.175
	3	Mean	1.6	1.917	3.2	1.35	2.325
		N	10	10	10	10	10
		Std.Dev	0.285	0.523	1.033	0.242	0.313
	4	Mean	2.05	2.483	3.3	2.15	2.325
		N	10	10	10	10	10
		Std.Dev	0.393	0.76	1.127	0.626	0.121
Total	1	Mean	3.034	2.926	3.745	2.889	3.045
		N	72	72	72	72	72
		Std.Dev	0.661	0.806	0.552	1.199	0.612
	2	Mean	3.043	3.152	3.619	3.329	3.021
		N	35	35	35	35	35
		Std.Dev	1.305	1.251	0.947	1.388	0.673
	3	Mean	2.985	3.144	3.833	2.977	3.148
		N	22	22	22	22	22
		Std.Dev	1.36	1.21	0.953	1.562	0.801
	4	Mean	2.343	2.804	3.608	2.324	2.441
		N	17	17	17	17	17
		Std.Dev	0.469	0.806	0.945	0.585	0.188

[a]The age categories are represented by **1** (19-30), **2**(31-42), **3**(43-54), and **4** (Over 55).

Appendix IV: Model Analysis

Table 4A-10: Model Coefficients of Background Characteristics

Coefficients						
Model		Unstandardized		Standardized	T	Sig.
		B	Std. Error	Beta		
	(Constant)	3.500	0.514		6.813	p<0.001
	Education	0.250	0.144	0.306	1.732	0.117
Students	Income	-0.750	0.144	-0.919	-5.196	0.001
	(Constant)	2.448	0.317		7.715	p<0.001
	Gender	0.463	0.146	0.328	3.167	0.003
	Education	-0.045	0.098	-0.066	-0.465	0.644
	Income	0.252	0.049	0.720	5.194	p<0.001
Civil Servants	Age	-0.156	0.080	-0.199	-1.961	0.056
	(Constant)	1.027	0.425		2.418	0.020
	Education	0.200	0.141	0.198	1.415	0.164
	Income	0.443	0.227	0.272	1.954	0.057
Housewives	Age	0.049	0.079	0.086	0.613	0.543

Predicted: *Material Access*

Coefficients						
Model		Unstandardized		Standardized	T	Sig.
		B	Std. Error	Beta		
	(Constant)	6.667	1.370		4.867	0.001
	Education	-1.000	0.385	-0.676	-2.598	0.029
Students	Income	0.667	0.385	0.451	1.732	0.117
	(Constant)	3.378	0.226		14.946	p<0.001
	Gender	0.506	0.104	0.466	4.854	p<0.001
	Education	0.415	0.070	0.777	5.968	p<0.001
	Income	-0.224	0.035	-0.831	-6.481	p<0.001
Civil Servants	Age	0.092	0.057	0.151	1.618	0.113
	(Constant)	4.925	0.602		8.181	p<0.001
	Education	-0.481	0.200	-0.328	-2.407	0.020
	Income	-0.029	0.321	-0.012	-0.091	0.928
Housewives	Age	-0.242	0.112	-0.295	-2.151	0.037

Predicted: *Internet Interest*

Coefficients						
		Unstandardized		Standardized	T	Sig.
Model		B	Std. Error	Beta		
	(Constant)	-4.000	p<0.001		.	.
	Education	2.000	p<0.001	1.000	.	.
Students	Income	p<0.001	p<0.001	p<0.001	.	.
	(Constant)	1.995	0.447		4.461	p<0.001
	Gender	0.767	0.206	0.346	3.721	0.001
	Education	0.009	0.138	0.008	0.065	0.948
	Income	0.382	0.068	0.695	5.592	p<0.001
Civil Servants	Age	-0.471	0.112	-0.382	-4.208	p<0.001
	(Constant)	0.506	0.286		1.770	0.083
	Education	0.249	0.095	0.327	2.624	0.012
	Income	0.498	0.153	0.405	3.261	0.002
Housewives	Age	0.060	0.053	0.142	1.130	0.264

Predicted: *Internet Confidence*

Coefficients						
Model		Unstandardized		Standardized	T	Sig.
		Beta	Std. Error	Beta		
	(Constant)	1.000	0.514		1.947	0.083
	Education	0.500	0.144	0.548	3.464	0.007
Students	Income	0.500	0.144	0.548	3.464	0.007
	(Constant)	1.730	0.245		7.048	p<0.001
	Gender	-0.162	0.113	-0.137	-1.432	0.159
	Education	0.219	0.076	0.378	2.899	0.006
	Income	0.167	0.038	0.571	4.453	p<0.001
Civil Servants	Age	-0.122	0.061	-0.186	-1.988	0.053
	(Constant)	2.047	0.084		24.410	p<0.001
	Education	-0.048	0.028	-0.145	-1.712	0.094
	Income	0.429	0.045	0.808	9.570	p<0.001
Housewives	Age	-0.053	0.016	-0.290	-3.408	0.001

Predicted: *Internet Literacy*