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DEVELOPMENT OUTCOMES OF THE NEW TECHNOLOGIES TO THE QUALITY OF LIFE OF LOW-INCOME HOUSEHOLDS IN KENYA: A CASE STUDY OF NAIROBI.

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Declaration

I declare that this thesis is my original work and it has not been presented previously in part or whole to any university for a diploma, degree or any other qualification.

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This thesis has been submitted with our permission as supervisors

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Abstract

There has been a rapid increase in the use of new technologies (Internet, email and mobile phones) across the social-economic groups in Kenya. The mobile phone revolution, with penetration down to the poorest of the poor, has challenged the assumptions that low-income households have no use for the new technologies. It has demonstrated that despite their financial constraints, they value and use what they perceive to be of benefit. Usage has resulted in diverse development outcomes, influencing quality of life. The focus of the government, civil society, development partners and communication operators, however, has been more on the access of the new technologies and less on what happens after access in transforming individuals, households and communities.

This study aims at contributing to the body of knowledge in Information and Communication Technologies for Development (ICT4D). Using the Capability Approach as the theoretical framework, whose focus is expansion of people's capabilities to lead lives they have reasons to value, it examined development outcomes of the new technologies on the quality of life of low-income households in Kenya, using Nairobi as a case study. The study examines the factors that influence the usage and the capabilities enabled through the technologies. It discusses the role of choice in mediating the conversion of enabled capabilities to development outcomes, and the relationship between the derived development outcomes and the quality of life.

The study used quantitative and qualitative data derived from a secondary database comprising households distributed across the country, complemented by a detailed survey that focused on three clusters resided by low-income households in Nairobi. The quantitative data was analysed using statistical methods—specifically measures of central tendency and measures of relationships while the qualitative data was analysed using the framework based approach.

The study argues that individual choices influence the ultimate decisions made and dictate the development outcomes derived from the usage of the new technologies. It establishes that households have different perceptions on the role that the new technologies should play in enhancing their quality of life and this influences the choice they make. The findings demonstrate a relationship between the development outcomes of using the new technologies and the quality of life: The positive development outcomes lead to an improved quality of life while the negative development outcomes negate the general expectations of good quality of life. Age, income, gender, marital status, education and skills influence the usage of the new technologies in different ways. Perceptions and preferences influence the usage too.

The study contributes to knowledge through: developing a context-specific list of enabled capabilities from the use of the new technologies; identifying twelve development outcomes from the enabled capabilities; showing a relationship between the development outcomes and the low-income households' desired quality of life; and a summary table indicating the extent of the role demographic factors play in influencing the development outcomes. A template is derived from summary for use by scholars.

The study concludes by noting that as the new technologies continue evolving and being integrated into the daily activities of the low-income households, expectations that they would solve development challenges should not ignore individual capabilities, power relations, and social structures. The study notes that vision 2030 has emphasized the overarching role of Science, Technology, and Innovation (STI) and observes that with the spread of the new technologies, it is becoming less viable to measure individual work inputs by just verifying time of physical presence. The policy implication is that the government and employers would need to come up with different measures of productivity. The study recommends for guidelines and policies that would ensure that rational choices are made when engaging through the new technologies.

Keywords: *Capability Approach, Low-Income Households, Choice, Quality Of Life, Mobile Phones, Internet, ICT, Capabilities, and Development Outcomes.*

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List of Abbreviations

BoP .....Bottom of the Pyramid
BPO .....Business process Outsourcing
CA .....Capability Approach
CCK .....Communication Commission of Kenya
CPI .....Consumer Price Index
CSR .....Corporate Social Responsibility
DHIS .....District Health Information System
ERSWEC .....Economic Recovery Strategy for Wealth and Employment Creation
ERS .....Economic Recovery Strategy
GOK .....Government of Kenya
HH .....Household
LIH .....Low-Income Households
ICT .....Information Communications Technologies
ILO .....International Labour Office
KNBS .....Kenya National Bureau of Statistics
MDGs .....Millennium Development Goals
Mbps ... .Megabits Per Second
NOFB .....National Terrestrial Fibre Optic Network
PRSP .....Poverty Reduction Strategy Paper
RIA .....Research ICT Africa
SIM .....Subscriber Identification Module
SMS .....Short Messaging Service
UNDP .....United Nations Development Programme
WRI .....World Resources Institute

Part I

Introduction, Literature Review and Research Process

Chapter 1

Introduction

1.1 Introduction

Access and usage of Information and Communication Technologies (ICT) is critical in society today. This is due to the opportunities they provide in the world economy, described as knowledge-based and information driven (Duncombe & Boateng, 2009). Despite this fact and the extensive usage of ICT in Kenya, there is limited documentation that can show the development outcomes of using these technologies by low-income households. This study uses the Capability Approach (CA) developed by Amartya Sen to assess the development outcomes of ICT and specifically the new technologies limited to Internet, email and mobile phone to the quality of life of low-income households in Kenya.

This chapter provides the foundation of the thesis. The chapter discusses the status of the new technologies in Kenya and gives an overview of income classification. It introduces the Capability Approach, which is the theoretical framework for the study. The chapter highlights the study problems that generated the study topic. The study objectives and the key questions are presented, followed by the study scope and definition of the key words used. The chapter ends with a brief description of the organisation of the thesis.

1.2 Background to the Study

1.2.1 The New Technologies in Kenya

Use of Internet, email and mobile phone (referred to as the new technologies in this study) has witnessed a rapid increase, introducing radical changes to Kenya's low-income households. Mobile phones in particular have become the basic means of

communication for most Kenyans regardless of their economic status or geographical location. They have become increasingly affordable to low-income households.

According to Communication Commission of Kenya (2010) statistical reports, there were 7.8 million Internet users, including Internet mobile users and 20.1 million mobile phones users as at June 2010. Kenya's population by the 2009 census was 38.6 million (KNBS, 2010) an indication that about 51.2 per cent of the population was using mobile phones in 2010. Mobile Internet and mobile broadband have become widespread.

The first mobile telephone service was analogue system that began in 1993. Only 20,000 subscribers were connected by 2000 all based in Nairobi. Following deregulation and partial privatization of the telecommunications sector, the number of mobile phone subscribers increased 1000 times to the current number of 20.1 million over the last 10 years. At the beginning, few people owned handsets and this led to the spread of community model of services referred to as "simu ya jamii[1]" and "simu yetu[2]" by Safaricom and Celtel (formerly Zain and currently Airtel) respectively. However, since the taxes on mobile phone sets were removed in 2007, and second-hand mobile phones became available in the market, people have been able to own their individual sets increasing the usage as demonstrated by a total teledensity of 53.3 per cent with mobile phones accounting for 51.2 per cent as at June 2010 (CCK, 2010). Those who cannot afford to own a handset have a SIM card and are able to borrow a handset and communicate.

With the fast growth of social network sites such as Facebook, Twitter and Blogs, Internet usage is not synonymous with email usage. People are progressively using the Internet for diverse reasons. Commercial Internet services were introduced in Kenya in 1995. In 2004, there were an estimated 500,000 active Internet users, representing 1.6 per cent of the population. By 2007, the number increased to 2.9 million (7.5 per cent of

[1] Peoples' phone
[2] Our phone

the population), and by June 2010 the number of users were 7.8 million, a penetration rate of about 20 per cent. By June 2010, 3.2 million people subscribed to mobile Internet, over 8 per cent of the population, which translates to about 41 per cent of Internet subscriptions (CCK, 2010). A major innovation by the mobile phone companies is the introduction of data enabled smart phones, which give Kenyans access to Internet through their mobile phones.

The Kenyan government has emphasized the role of the new technologies in development. Removal of taxes has created an enabling environment for the sector to grow. However, policy emphasis has been on ICT for development without clarity on how ICT improves and transforms the lives of individuals and households. The Kenya ICT policy (2006) emphasized the role of ICT in development. The Kenya Communications (Amendment) Act (2009) created a Universal Services Fund (USF) whose objective and purpose is to support widespread access, support capacity building and promote innovation in information technology services across the country (KCA, 2009).

Kenya's development blueprint, Vision 2030 has strategically positioned Business Process Outsourcing (BPOs), Information Technology Enabled Services (ITES) as one of the six key sectors in the economic pillar (GoK, 2007). In addition, its Medium Term Plan (MTP) that runs from 2008/09 to 2011/12 has as its vision "Kenya becomes an information and knowledge based society" (GoK, 2008). The overall goal of the ICT MTP is "to facilitate provision of equitable and affordable quality information and communication services countrywide". The document recognises ICT's goods and services as facilitators of productivity and enablers of economic growth through development of a knowledge-based society, emphasizing the overarching role of Science, Technology, and Innovation (STI) Initiated ICT projects include the underground submarine cable and the National Terrestrial Fibre Optic Network (NOFB) expected to facilitate widespread connectivity across the country (*ibid.*).

Technology convergence and usage of common infrastructure to transmit packets of voice and data has merged the uses of the new technologies. While the study acknowledges that technologies deliver different capabilities to users, the new technologies uniquely embody multiple capabilities. This includes most of the capabilities of earlier technologies such as radio, television and fixed telephones. Ultimately, this has brought drastic changes to households' lifestyles.

1.2.2 Low-Income Households (LIH) in Kenya

The study focus is low-income households referred to as Bottom of the Pyramid (BoP) in some literature. Prahalad (2004) argues that 4 billion people live on an income of below US$ 5 per day constituting those at the BoP. In Kenya, 46 per cent of the population is classified as poor (KNBS, 2007). The basic report on well-being in Kenya describes urban poor people as living on US$1.3[3] per day while the rural poor live on US$0.74 per day (*ibid.*). This translates to US$ 39 per month and US$466 per year for the urban and US$ 22 per month and US$ 264 per year for the rural households.

In 2008, Kenyan National Bureau of Statistics (KNBS) modified the income classifications, which had been classified as 1-Upper Class, 2-Upper Middle Class, 3-Middle Class, 4-Lower Middle Class, and the 5-Lower Class. The urban Consumer Price Index (CPI), has the income groups for Nairobi comprised of households in the lower-income group with a gross monthly income of below US$ 315.60 (Kshs. 23,671) and constitutes 72.12 per cent of the households. Middle-income group has a gross monthly income of between US$ 315.60 -1,600 (Kshs. 23,671 - 120,000) and constitutes 24 per cent of the households; and the upper-income group has a gross monthly income of above US$ 1,600 (Kshs. 120,000) and constitutes 3.76 per cent of the households (KNBS, 2008). CPI is based on a fixed basket of goods and services bought in the base year. Prices for the basket were deflated to October 2005 following the Kenya Integrated Household Survey (KNBS, 2005) that aimed at updating the urban

[3] Exchange rate of Ksh. 75 to a dollar (the rate will be used for the rest of the thesis)

consumer price index to reflect the prevailing consumption and expenditure patterns from the previous update of 1994.

The documented information complemented by discussions with KNBS staff revealed that households across the country with income of Kshs. 23, 671 or less are regarded as low-income households (see Table 1).

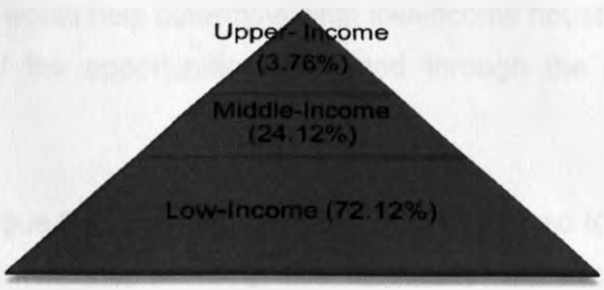
Table 1: KNBS Nairobi Clusters Classification

Old classification	New classification	Monthly income (Kshs.)	% population
5=Lower Class	Low-income group	less than 23,671	72.12%
4=Lower Middle Class			
3=Middle Class			
2=Upper Middle Class	Middle-income group	23,671-120,000	24.12%
1=Upper Class	Upper-income group	Above 120,000	3.76%

Source: (Adopted from KNBS, 2009)

This study focuses on the low-income group in the new classification but more specifically on the lower middle class (4) in the old classification. These households constitute 72.12 per cent of the households in Nairobi (see Figure 1). The focus on the lower middle class (4) ensured that households selected used a combination of the new technologies. Most households in lower class (5) were not using the new technologies particularly the Internet from the preliminary analysis of RIA (2007) secondary database.

Figure 1: Classification of Income Groups



Source: (Adopted from KNBS, 2009)

Further, the huge number of low-income households dictated the need to focus on this particular group to assess the development outcomes associated with the usage of the new technologies. The revolution of the mobile phones in Kenya with penetration down to the poorest of the poor has challenged the assumptions that low-income households have no use of the new technologies. It has demonstrated that despite the financial constraints, the low-income households' value what they perceive to be of benefit to them.

1.2.3 The Capability Approach (CA)

The Capability Approach, developed by Amartya Sen argues that human development should be viewed as a process of expanding people's capabilities (Sen, 1999). What matters, according to Sen, is what people are capable of being, or doing, with the goods to which they have access. The central insight in the Capability Approach is for people to realize their human capabilities (*ibid.*).

The study notes that policies that take into account universal access of the new technologies look at ways of providing access without considering the points that Sen raises in his theory about the differences among people in the ways they value and transform the same bundle of goods and the goals they have for using them (Sen, 1999).

Access and usage of the new technologies does not necessarily lead to development unless other entitlements are provided. Use of Capability Approach as the theoretical framework for this study would help determine what low-income households are able to do and be because of the opportunities presented through the use of the new technologies.

Alampay et al. (2003) argue that an integrated approach is required to make use of the technologies in development that not only look at access and usage, but also the capabilities of people. Heeks (2002) explains that for data or information made

available through new technologies to have an impact on households' quality of life, social, economic and knowledge resources are required to help the households' access, assess and apply the information. The creation of opportunities that are necessary for the realization of these capabilities should be the direction of the policies (*ibid.*).

1.3 Statement of the Problem

As Mansell (1998) and Norris (2001) allude, emphasis has been placed on providing access to new technologies without analyzing the value information and knowledge exchanges play for development. In Kenya like in the rest of the world, the focus has been on access without considering whether access is leading to more opportunities resulting to improved quality of life enhanced by conditions such as supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment, and attractive environment.

Secondly, the new technologies have different uses and development outcomes based on the person's interest. There have been national, regional and global campaigns focusing on how the new technologies could be used to create digital opportunities and inclusions reducing the digital divide. Despite the campaigns and activities around the new technologies, there is no adequate documented literature indicating their usage at the household level and the development outcomes they have had to low-income households in Kenya.

Thirdly, as Heeks (2002) points out, the real potential of the new technologies in development has not been understood and explored. Positive aspects of the technologies in development projects are overstated, without a deeper reflection on the reality of the impact on the beneficiaries. In spite of the acknowledgement that the new technologies provide opportunities to improve individuals' productivity and expansion of options and choices to means of livelihoods, a linkage of their use to the households' development outcomes is yet to be established fully.

Finally, factors influencing the use of the new technologies in low-income households in Kenya have not been fully explored. While access to a basic good is a prerequisite to use, the Capability Approach developed by Sen argues that individual differences, capabilities and choice play a role on whether people make use of these goods, how they use them and how they are valued (Sen, 1999). Low-income households are presumed to have limited needs most of which are at the basic level with new technologies given a low priority. However, literature has shown that people make choices that could be against the norm based on their psychology, personal traits, and characteristics (Robeyn, 2005). They have different perceptions on the role that the new technologies should play in improving their quality of life. Further, households have different ways of transforming the same bundle of goods into opportunities for achieving their plans in life.

These factors influence the households' purchasing power and usage of the new technologies. Notwithstanding, individuals have the freedom to choose whether to apply the new technologies in their lives or not, even when they are capable of using and have the resources. This is sometimes a function of their own perceptions of its value and utility in their life.

The core question that the study seeks to answer is; ***"To what extent does use of the new technologies enhance the capacity of low-income households in Kenya to achieve their desired quality of life in social, economic and knowledge dimensions of development?"***

1.3.1 Why Social, Economic and Knowledge Dimensions

The new technologies not only connect the low-income households to the infrastructure of the world digital economy, but they allow them to become digital producers and innovators. The study narrowed to three dimensions of development namely social, economic and knowledge dimensions. These dimensions were selected because of the interrelationship between them and the influence that the new technologies have on

each of them. Usage of the new technologies by the low-income households has an influence on social dimensions of development, which in turn influences the economic and knowledge dimensions of development. Consequently, influence of the new technologies in the knowledge dimension influences the social and economic dimensions of development. The development outcomes of using the new technologies in one-dimension affects the other two dimensions of development positively or negatively based on the lenses interpreting the outcomes as will be discussed in chapter 6.

1.4 Objectives of the Study

The key objective of this study was to assess the development outcomes of using the new technologies (Internet, email and mobile phones) to the quality of life of low-income households' in Kenya but more specifically in Nairobi using the Capability Approach. As discussed above, the development outcomes were restricted to social, economic and knowledge dimensions.

The sub-objectives of this study were the following:

1. To assess the factors influencing the use of the new technologies in low-income households in Kenya.
2. To assess the capabilities enabled by the use of the new technologies in the social, economic and knowledge dimensions of development in low-income households in Kenya.
3. To establish the development outcomes derived from the enabled capabilities of using the new technologies in the social, economic and knowledge dimensions of development by low-income households, a case of Nairobi.
4. To assess the scope of the role the demographic factors play in influencing the development outcomes of using the new technologies in the low-income households and derive a template for predicting the odds of development outcomes occurring given the six demographic factors.

5 To highlight the perceptions of low-income households on the role of the new technologies in improving their quality of life in the social, economic and knowledge dimensions of development.

1.5 Significance of the Study

Policy makers, development partners and technology operators and providers would be interested with the study topic and findings in addition to academic leaders.

The study contributes to knowledge through developing a context specific list of enabled capabilities and development outcomes through the use of the new technologies in low-income households in the social, economic and knowledge dimensions of development that. It further develops a list of key attributes of quality of life as perceived by the low-income households. This could be tested by other researchers interested in the subject area.

The focus on low-income households will assist policy makers, and development actors and practitioners including the civil society to address poverty using ICT. There has been policy emphasis on ICT for development without clarity on how they improve and transform the lives of individuals and households. When coming up with policies on information and communication technologies for development, they will have a better understanding of the various outcomes derived from the usage of the new technologies by the low-income households. This will enable them to make strategic interventions to mitigate the effects of the negative development outcomes and maximise on the positive development outcomes, fast tracking vision 2030 and related national and regional plans. The summary that shows the scope of the role the demographic factors play in influencing the development outcomes of using the new technologies in low-income households will inform policies. For instance, the study found out that education and skills were key for the low-income households to derive full benefits from use of the new technologies. This is in line with Marker et al., (2002) argument that there exists a strong correlation between access to education and knowledge and poverty indicators.

The study links the development outcomes of using the new technologies in low-income households in the social, economic and knowledge dimensions of development to the households' perceived attributes of a good quality of life. This provides development actors and practitioners with a wider view of what the low-income households' value. Relationships may not be given much emphasis yet they affect other aspects of human development immensely as demonstrated in the study. The study explores an integrated approach to development where expansion of capabilities in the social, economic and knowledge dimensions would be the focus. This will inform policy interventions on the role of the new technologies in enhancing low-income households to achieve their desired quality of life, forming a basis for strategic planning and investment.

The investors and industry operators in the field of information and communication technologies will benefit from the study. Information on how the low-income households are using the new technologies and the valued features and usage pattern by the various categories of the users will guide them in coming up with products that would address the needs of the low-income households. The findings will inform the operators' strategic planning including where they need to target their corporate social responsibility (CSR) projects that would be in line with facilitating low-income household achieve their desired quality of life. The documentation of the households' perceptions of a good quality of life and the role the new technologies play in achieving their desired quality of life will inform their projects design and implementation.

Finally, the study will be of significant importance to the government and employing institutions of the low-income households. The study shows that the new technologies weaken the control of formal institutions over their members' behaviour through opening opportunities for them to reduce or interrupt their formal role involvements by engaging in private interactions anywhere and anytime. This implies that it will be less viable to measure individuals' work inputs by simply verifying the time of physical presence. Employers in both formal and informal sector could use the study findings to put

measures that mitigate employees' use of working time for private online activities and personal calls, which will lead to improved productivity.

1.6 Scope and Application of the Study

The study is grounded on a conceptual framework developed from reviewed literature and informed by the study question and objectives. The focus is on three dimensions of development namely social, economic and knowledge due to their interrelationship with the new technologies, which has promoted and sometimes hindered various aspects of their development as earlier indicated.

The study partly used documentary method based on a secondary database, Research ICT Africa (RIA) ICT access and usage household survey data (2007) referred to as RIA (2007) database in this study. The secondary database, which was weighted to make it nationally representative, gave an overview of usage of the new technologies in the low-income households across the country and the factors that influenced the usage. Following the analysis of the relevant variables, from the database, eight potential benefits of using the new technologies referred to as enabled capabilities in the social, economic and knowledge dimensions of development were developed. The researcher wishes to use the following classification to refine the scope and dimensions (see Table 2).

Table 2: Study Scope and Dimensions

	Development Dimensions	Enabled Capabilities
1	Social	Communication and information access
		Social status -social inclusion and exclusion
		Security
		Privacy and intrusion
2	Economic	Income change
		Jobs and employment access
3	Knowledge	Skills and individual productivity
		Knowledge accumulation and dissemination

Source: (Analysis of RIA (2007))

The findings from the analysis of the RIA (2007) informed the design of the survey (2010) questionnaire. The eight capabilities were subjected to public scrutiny through the survey (2010) that targeted three low-income clusters also referred to as enumeration areas (EA) in Nairobi. The clusters are Ofafa 1 cluster number 1271, Umoja II cluster number 1294, and Riruta Satellite cluster number 1349 as per the KNBS's maps. This aimed at establishing if the eight were the valued capabilities in the three clusters, which were resided by the low-income households. The study focuses on the household as the unit of analysis as opposed to individuals while taking into account that perceptions and preferences are embedded in individuals with the outcome of their influence visible at the household level. The Capability Approach is flexible and accommodates individuals and households as units of analysis. The study takes into account households' dynamics and notes that individual usage of the new technologies affects the household in diverse ways.

1.7 Research Limitations

The study identifies the following as the limitations.

Human development research is complex; involving many aspects of the person. People's perceptions and preferences are subjective in nature, making the behaviour of one person to be different from that of another. Further, as Clark (2003) points out, when dealing with questions that relate to perceptions and preferences, respondents may conceal some perceptions and preferences to avoid embarrassment. In addition, they may want to impress the interviewer hence give the information that in their view, will create a better impression of themselves. The study findings could be strengthened through a longitudinal study involving other methods like ethnography that look into daily activities of the low-income households. The study would include other aspects of human behaviour and personality traits.

As demonstrated in the study, choice is a complex concept with many factors influencing it. The study looked at the demographic (age, income, gender, marital

status, education and skill) and personal factors (perceptions and preferences). The influence of other factors such as personal history, psychology, social norms, culture, and the wider environment should be studied.

The focus of this study was on low-income households, who were already disadvantaged in monetary terms hence their financial capabilities were lowered. That being the case, the enabled capability list developed, derived development outcomes and the order of the key attributes of quality of life are context specific to low-income households. However, they could be tested in medium and high-income households to establish if they apply to this income groups too.

1.8 Definition of Terms as Used in the Study

Agency: Is a person's ability to pursue and realize goals that he or she values and has reason to value that do not necessarily benefit him or /her directly as used by Sen.

Binary logistic regression: Is a form of regression used when the dependent variable is a dichotomy and the independents are of any type. The goal is to find the best set of coefficients. The slope values of the regression equation are the B coefficients. *Sig* refers to p-value, the measure of statistical significance of the variables being measured and *Exp(B)* is the standardised regression coefficients also called the odds ratio (OR), which estimates the change in the odds of dependent variable with a unit change of the independent variable.

Deprivation: Is lack of what is needed for well-being. Its dimensions are physical, social, economic, political and psychological/spiritual. It includes forms of disadvantage such as physical weakness, isolation, poverty, and vulnerability.

Development dimensions: Are the set of capabilities in the three dimensions of development namely social, economic and knowledge.

Development Outcomes: Are the *Functionings* in Sen's Capability Approach. They are achieved status (Being and Doings) in social, economic and knowledge dimension of development enhanced by the use of the new technologies.

A Dummy variable: Is a variable created by turning a nominal variable into one or two-category variables by making one category into reference category, to which the others are compared.

Enabled capabilities: Are opportunities availed to households due to use of the new technologies.

Head of household: Is the person who owns the housing unit or pays the rent for the house and contributes to the house expenses and decision-making. In the

case of a couple, either was regarded as the head of the household when collecting data.

Household: Constitutes a person or group of persons, who live together in the same housing unit, have common cooking arrangements and shared expenditure.

Hosmer & Lemeshow p-values: Assesses the fit of the model by comparing the observed and expected frequencies.

Low-income Households: Are households living on a monthly gross income of less than Kshs. 23,671 (US$ 315.60) as defined by the KNBS.

Nagelkerke: Is one of the Pseudo-R^2 values that gives an idea of fit of the model. *Nagelkerke's* R^2 is part of SPSS output in the 'model summary' table and is the most-reported of the R-squared estimates.

New Technologies: Refers to Internet, email and mobile phones. They are part of Information and communication technologies (ICT).

Quality of Life: Is the felt status of individuals in the social, economic and knowledge dimension of development. It is the unique experience of the Individual.

Well-being: Is regarded as a component of quality of life. It is the experience of a good quality of life. There are five dimensions of well-being namely physical well-being, material well-being, emotional well-being, social well-being, and developmental well-being.

3G Technology: Is a generation of standards for mobile phones and mobile telecommunication services fulfilling defined specifications by the International Telecommunication Union.

1.9 Organisation of the Thesis

The thesis is structured in a way that people not involved in the study would engage with the arguments. A simple language that can be understood by technical and non-technical people has been used to communicate and present the arguments all through the study. The thesis is divided into three parts.

Part One: Introduction, Literature Review and Research Process

The first part consists of Chapter 1, 2 and 3. **Chapter 1** laid the foundation for the whole study. It introduced the study by presenting the background , objectives, and the study question. It defined the scope of the study, limitations, and key words used. **Chapter 2** discusses the theoretical and empirical underpinnings of the study. It presents the conceptual framework and a set of hypotheses formulated from the objectives, research framework, and the literature reviewed. **Chapter 3** gives an overview of research process and the methods used in data collection and analysis.

Part Two: Findings and Discussions

The second part, which comprises Chapter 4, 5, and 6, discusses the study findings. **Chapter 4** discusses the demographic and personal factors influencing the usage of the new technologies in low-income households. **Chapter 5** discusses the enabled capabilities from the use of the new technologies and the role of choice in mediating the conversion of enabled capabilities to development outcomes. **Chapter 6** discusses the derived development outcomes and their linkage to the quality of life as perceived by the low-income households. The chapter concludes the section by linking the findings to the hypotheses and framework.

Part Three: Summary Conclusions and Recommendations

The third part comprises Chapter 7. **Chapter 7** concludes the study by linking the findings to the framework and hypotheses. It links the findings to the study question and objectives. The chapter highlights the contributions made by the study and the usefulness of Capability Approach in implementing and evaluating information systems. Overall conclusions are drawn in this chapter with a highlight of the implication of the research findings to information systems and policy.

Chapter 2

Literature Review

2.1 Introduction

Development was originally conceptualized as a linear, straightforward technical intervention to push nations along a linear path from 'less developed' to 'more developed' with a primary focus on macroeconomic indicators such as the gross national product (Drèze and Sen, 2002). However, most development practitioners have rejected this view as flawed and overly simplistic stating that macroeconomic indicators do not show how wealth is distributed or how the political, economic and social factors contribute to the quality of life (McGregor, 2006). The thesis views development as the process of economic and social transformation that is based on complex cultural, and environmental factors and their interactions.

This chapter examines the theoretical and empirical foundations of the study. It looks at development as a concept, examining how different theories have defined and interpreted it. The Capability Approach and its various components are explored including its applications in the field of information and communication technologies for development. The households' dynamics and the role of the new technologies in development are examined. The chapter concludes by presenting the conceptual framework and three hypotheses that are tested in part two of the thesis.

2.2 Development as a Concept

Development as freedom's basic proposition is that it should be evaluated in terms of the expansion of the capabilities of people to lead the kind of lives they value and have reason to value (Sen, 1999). Sen conceives development as a process of expanding the real freedoms that people enjoy and emphasizes the need for the expansion of persons' capabilities. His view of development places people and their human

development at the center of development process. He stresses the importance of the individuals' empowerment arguing that greater freedom enhances the ability of people and influence the world, which is central to the process of development (*ibid.*). He provides an alternative definition of development as an increase in the overall number and quality of choices available to individuals in pursuing their lives and livelihoods. What matters, according to him, is what people are capable of being, or doing, with the goods to which they have access (Sen, 1999).

According to a human development report, the basic objective of development is to create an enabling environment for people to enjoy long, healthy, and creative lives (UNDP, 1990). The expansion of human capabilities has both direct and indirect importance in the achievement of development. The indirect role works through the contribution of capability expansion in enhancing productivity and raising economic growth. The direct importance lies in its intrinsic value and its constitutive role in human freedom, well-being, and quality of life (Sen, 1997). "Having greater freedom to do the things one has a reason to value is significant for a person's overall freedom as well as in fostering the person's opportunity to have valuable outcomes" (*ibid.*).

Dreze and Sen (2002) define freedom as the range of options a person has in deciding what life to lead. It involves decision making which can sometimes leave a person less happy and unfulfilled (Sen 1992). Poverty, described in these terms, represent the lack of freedoms, or *unfreedoms* (Sen, 1999), while development consists of the removal of all sources of *unfreedoms* that leave people with little choices and opportunities in exercising their reasoned agency (*ibid.*). The deprived need real freedom to overcome their deprivations. Such freedom is both an end and a means of development (Alkire, 2005).

2.2.1 Quality of Life (QoL) and Well-Being

This study takes well-being to be a component of quality of life. There are different dimensions of well-being. Poverty in its multi-dimensions manifests itself as ill-being and ultimately as low quality of life.

According to McGregor (2006), peoples' perceptions of their quality of life is dynamically interlinked in different communities and dictated by social, economic, knowledge, cultural, political and environmental factors. The perceptions inform the goals and actions they pursue to achieve a satisfactory quality of life. The goals and the actions are largely shaped by the material, social and cultural contexts in which people are embedded from the individual through family, community, nation, state to the increasingly interconnected global society.

Schalock (2001) asserts that it is not possible to define quality of life. He argues that the definition assigned to the term, and the way it is used, depends on the objectives and context. Rice (1985) defines quality of life as a subjective assessment of an affective component of happiness and a cognitive component of satisfaction. Happiness is an affective concept reflecting a state of mind associated with feelings of joy, serenity, and affection (Sirgy, 2002). Satisfaction involves cognition by requiring an individual to evaluate one's life conditions and accomplishments against what one thought to be an appropriate standard or goals (Diener, 2005).

Campbell (1976) and Diener (2005) argue that quality of life involves vertical and horizontal spill over effects. Vertical spill over theory suggests relationships between domain specific quality of life and overall quality of life. Horizontal spill over theory shows that quality of life in a particular life domain influences quality of life in other life domains. For instance, positive experiences one has in the leisure domain may spill over to the work domain, thus making the job less stressful (Diener, 2005). Sirgy (2002) explains that horizontal spill over may occur between two life domains that have some overlap in activities supporting similar needs. Overall quality of life is a function of a

subset of quality of life in various life domains such as family, health, work, and education.

The recognition of the wide diversity among persons in terms of personal characteristics, social and environmental factors determines, according to Sen, the impossibility to evaluate the true quality of life of a household based on variables used by mainstream welfare theories, such as income, wealth, happiness and primary goods (Sen, 1992; 1999). Given equal endowments of goods, two different persons do not necessarily obtain the same level of quality of life. It depends on their differential capacity to convert these goods to outcomes.

Well-being is defined as a positive state of being with others in society, where needs are met, one can act effectively and meaningfully to pursue one's goals, and is able to experience happiness and feel satisfied with life (McGregor, 2006). The link between quality of life and well-being is that various aspects of well-being constitute quality of life. There are five main domains of well-being namely; physical well-being, material well-being, emotional well-being, social well-being and developmental well-being (Drèze and Sen, 2002). All five domains determine a person's quality of life. There are trade-offs between these different components of well-being such that a household may have to sacrifice education or food to obtain health care; sacrifice long term autonomy to alleviate short term insecurity or sacrifice short term happiness to secure long term satisfaction (McGregor, 2006).

Robeyns (2005) suggested that different approaches such as monetary resource and capabilities should be viewed as complementary in terms of evaluating well-being and ultimately quality of life. When people rate their life as having quality, they have a sense of self-esteem and pride regarding the life (*ibid.*). Development is the effort to improve or raise the quality of life in the various domains of well-being.

McGregor (2006) notes that well-being cannot be thought of as an outcome only, but as a state of being that arises from the dynamic interplay of outcomes and processes. He

states that well-being can be conceived in terms of the interplay between the resources commanded by a person, achievements with resources in terms of needs and goals met, and meanings given to the goals achieved and the processes in which they engage (*ibid.*). This ultimately defines the quality of life that people perceive themselves as achieving.

2.2.2 Poverty Globally and in Kenya

Poverty is the absence of options for obtaining basic needs. Globally, people have different perceptions and definitions of poverty (Robeyns, 2005). According to Alkire (2005), it is multidimensional and bound to the specific context in which it arises and to the perspectives and capacities of the individuals experiencing it. It takes the shape of hunger and inadequate nutrition, slum housing or homelessness, unhygienic living conditions, child and maternal mortality, unsafe water and ragged clothes among others.

The low-income households' presents an enormous untapped potential market previously thought of as unreachable or difficult to reach. Prahalad (2004) asserts that at the bottom of the pyramid where about 4 billion people are presumed to belong globally, majority live below $2 a day. The vast majority of those at the bottom of the pyramid live in rural villages and urban slums (Prahalad and Hart, 2002). A critique of bottom of the pyramid initiatives is that they focus too much on the reduction of income poverty, while they should aim more at the expansion of 'human capabilities' (Crabtree, 2007).

United Nations Development Program (UNDP) categorizes poverty as income poverty, capability poverty and participation poverty (Harris, 2004). The World Bank defines poverty beyond the income definition and adds on powerlessness, voiceless, vulnerability and fear. While the European Commission looks at poverty as lack of income and financial resources, deprivation of basic capabilities and lack of access to education, health, natural resources and infrastructure (Mehta et al., 2006). Capability

Approach interprets poverty as lack of actual possibilities to choose different forms of living. It is lack of opportunities to generate well-being (Sen, 1999). Poverty is identified in terms of capability deprivation, which can be the result of social restrictions on the one hand, or personal circumstances on the other (Dréze and Sen, 2002). Sen (1999) argues that there is a link between low-income and low capabilities.

Clark (2009) indicates that people can adapt in various ways, most distinct being downwards adaptation where they adjust aspirations to reflect disadvantaged circumstances and hardships. In upward adaptation, aspirations are adjusted to reflect new opportunities and what the peers or reference group have managed to achieve. Clark and Qizilbash (2008) argue that though the deprived learn to be satisfied with less, they are capable of making rationale judgment and choices.

Kenya maintains a mixed economy in which the government is actively involved in development planning, motivated by the need to optimize the use of the country's limited resources to meet national policy priorities. The fundamental policy priorities identified since independence are poverty, ignorance, and poor health (GoK, 1965). The goal of economic policy in Kenya has been to mobilize and ensure efficient utilization of resources to achieve high economic growth, an imperative to have its citizens enjoy decent living standards. Despite these credible objectives, the country's economic performance has been weak leading to high poverty incidences.

Poverty has manifested itself in various forms with 46 per cent of the population regarded as poor (KNBS, 2007). Of the poor, 75 per cent live in rural areas while the majority of the urban poor live in slum and peri-urban settlements. Indicators of poverty have increased with years particularly in the education and health sector.

Rising poverty levels prompted the government to draft a Poverty Reduction Strategy Paper (PRSP) (GoK, 2001). This initiative was in accordance with a long-term vision outlined in the National Poverty Eradication Plan (NPEP) and the United Nations endorsed Millennium Development Goals (MDGs) (GoK, 2007). The PRSP led to a

better understanding of causes of poverty and the development of the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) 2003-2007 popularly known as the Economic Recovery Strategy (ERS). The ERS led to increase in economic growth rate from 0.6 per cent in 2002 to 7.1 per cent in 2007 and poverty reduction from 56 per cent in 2000 to 46 per cent in 2006 (KNBS, 2007). There was a setback in the growth due to the violence that followed the disputed presidential elections at the end of 2007.

Vision 2030, Kenya's economic blue print launched in 2006 is informed by the outcomes of ERS. The vision aims at transforming Kenya into an industrialized, middle-income country in two decades. It is anchored on three pillars; economic, social and political. It seeks to make Kenya a globally competitive country by registering an annual growth rate of more than 10 per cent and sustaining it to the year 2030. The vision aims at reducing poverty from 46 per cent by between 3 and 9 per cent, which is where most industrializing countries in Africa are (GOK, 2007). The vision 2030 is being implemented through medium term strategic plans each running for five years with the first running from 2008 to 2012 inclusive.

2.3 The Capability Approach (CA)

The Capability Approach developed by Nobel laureate Amartya Sen is a critique of the utilitarian tradition of standard economics, which is one dimensional and ignores important non-utility aspects. In Sen's view, mainstream economic analysis operates on a very narrow base and does not include central information on human condition (Sen, 1992). The focus of the Capability Approach is on the individual capabilities with the framework being flexible for aggregation to the level of households, groups, and individuals.

Sen pointed out five distinct freedoms that contribute to the general capability of a person to live more freely. These are political freedoms, economic facilities, social opportunities, transparency guarantees, and protective security. He calls them

substantial freedom and describes them as follows: political freedoms are the opportunities that people have to determine who should govern and on what principles, and also include the possibility to scrutinize and criticize authorities, to have freedom of political expression and an uncensored press, and to enjoy the freedom to choose between different political parties. Economic facilities are the opportunities that individuals enjoy to utilize economic resources for the purpose of consumption, or production. Social opportunities are the arrangements society makes for education, health care, and other social services. Transparency guarantees relate to the need for openness that people can anticipate; the freedom to deal with one another with a justified expectation of disclosure and clarity. These guarantees play a clear role in preventing corruption, financial irresponsibility, and violation of society's rules of conduct for government and business. Finally, protective security refers to a social safety net that prevents sections of the population from being reduced to abject misery. He refers to institutional arrangements such as unemployment benefits and statutory income supplements to the impoverished as well as temporary arrangements such as famine relief or emergency public employment to generate income for them (Sen, 1999).

The capability perspective is concerned with the overall development of a human person in terms of the achievement of his or her most important needs or *Functionings* (Alkire, 2002). The main characteristics of the CA are its focus on doings and beings and the freedom to achieve them (Flavio, et. al, 2008). The Approach emphasizes human beings as free agents who realize their potential through choices. Human beings have a set of capabilities that can be actualized through normal process of development such as through education, play, nutrition, and family life (*ibid.*). These capabilities are presumed present in all people at birth.

At the heart of the CA is the importance of the "expansion of freedom ... both as the primary end and as the principal means of development" (Sen, 1999). Development is considered an extension of freedoms, viewed as the basic building blocks to development, as well as "the expansion of 'capabilities' of persons to lead the kind of life they value ... and have reason to value" (*ibid.*).

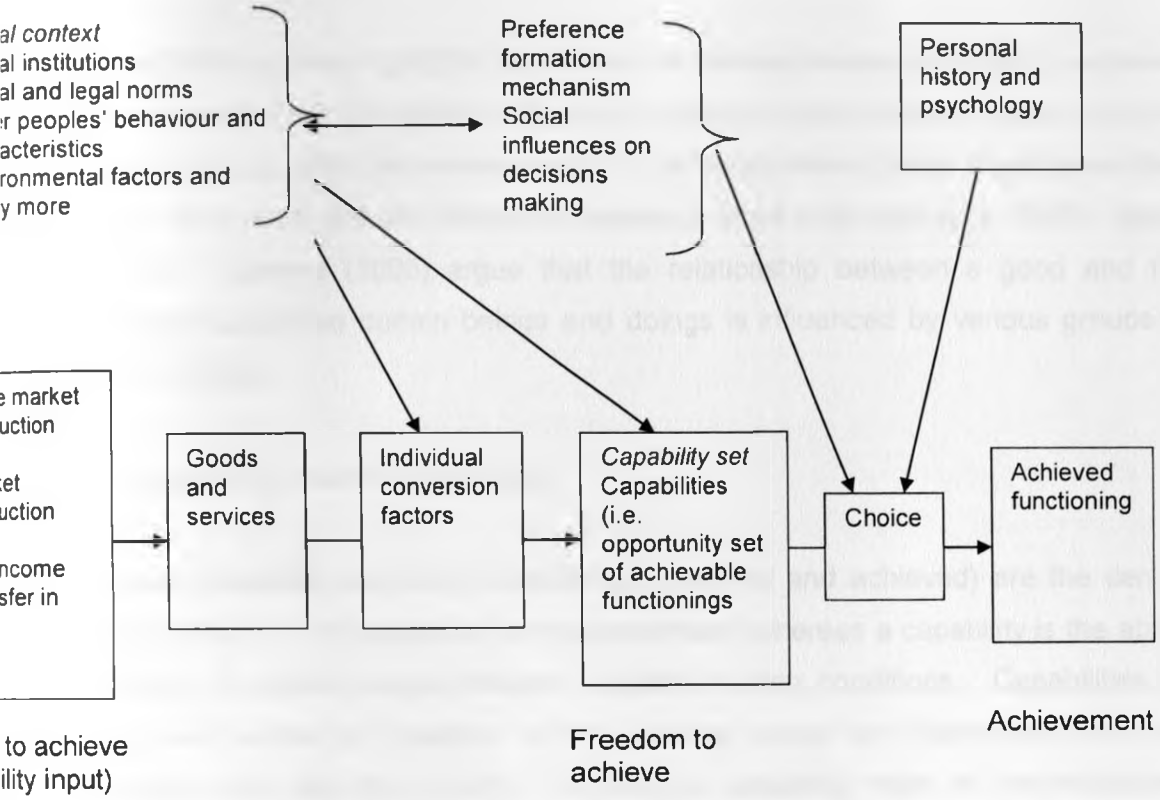
The CA recognises that a person's capabilities not only depend on social arrangements and institutions but it is also influenced by other peoples' actions (Sen, 1985). "Given the intrinsic importance of well-being, and indeed of agency, it is not credible that a person can morally evaluate his or her actions without taking note of their effects on the well-being and agency aspects of others including their well-being freedom and agency freedom" (*ibid.*).

Sen states that two people might have the same amount of resources but what they are able to do or be might be radically different (Sen 1999). He argues that capability expansion is in one sense a natural biological process. However, factors such as personal characteristics of individuals, the resources available to them, and the wider social and material environment determine the expansion process (*ibid.*).

The Capability Approach respects people's different ideas of the good life largely influenced by family, ethnic leaning, religious, community or cultural ties and background (Sen, 1999). According to Robyen (2005), there is no sufficient documentation on the extent to which people have genuine access to all the capabilities in their capability set, and whether members of their family or community punish them for making certain choices. The Capability Approach insists on inquiry of the context in which economic production and social interactions take place, and the circumstances in which people choose their opportunity sets (*ibid.*).

The CA takes into account the human diversity by its focus on the plurality of *Functionings* and capabilities as the evaluative space, and by the explicit focus on personal and socio-environmental conversion factors of commodities into *Functionings* (Robeyns, 2005). Robeyns demonstrates the three main aspects of the capability approach, which can be summed as means to achieve; freedom to achieve and the achievement (see Figure 2).

Figure 2 : Person's Capability Set



Source: Robeyns (2005)

Robeyns, (2005) and Sen, (1992), argues that the extent to which people generate capabilities from goods and services is influenced by three sets of conversion factors namely personal, social, and environmental factors. Personal factors include mental and physical conditions, literacy, and gender. Social factors include social norms like role of gender and religion, rule of law, public policies, and power structure while environmental factors include climate, infrastructure, resources, and public goods (Robeyns, 2005). The various components are discussed.

2.3.1 Means to Achieve

The Capability Approach highlights the difference between means and ends to achieve. The ends have intrinsic importance, whereas means are instrumental to reach the goal of improved quality of life and development. In some situations, these distinctions often blur, since some ends are simultaneously means to other ends (Robeyns, 2005). Alkire (2002) and Robeyns (2005) argue that the relationship between a good and the *Functionings* to achieve certain beings and doings is influenced by various groups of conversion factors.

2.3.2 Capabilities and *Functionings*

Capabilities (capability set) and *Functionings* (potential and achieved) are the central concepts of the CA. A functioning is an achievement, whereas a capability is the ability to achieve. *Functionings* are different aspects of living conditions. Capabilities, in contrast, are notions of freedom, in the positive sense and represents the real opportunities one has (Sen, 1987). A person's capability refers to the alternative combinations of *Functionings* that are feasible to achieve. Capabilities have been described as what people are effectively able to do and be (Robeyn, 2005), or the freedom that people have to enjoy valuable beings and doings (Alkire, 2005). These beings and doings are called *Functionings* (Sen, 1999).

Capabilities can either expand or contract, increasing or decreasing the overall number and quality of choices available to individuals in pursuing their livelihoods. Sen says that *Functionings* could be either potential or achieved (*ibid.*). Scholars working within the capability paradigm, including Nussbaum (2000), have labelled these potential *Functionings* as capabilities (Flavio et.al. 2008). Two people with identical capability sets are likely to end up with different types and levels of achieved *Functionings*, as they make different choices following their different ideas of the good life (Nussbaum, 2006).

2.3.3 Well-being Freedom and Agency Freedom

Sen (1992) differentiates between well-being freedom and agency freedom by stating that well-being freedom is one's freedom to achieve those things that are constitutive of one's being while agency freedom is freedom to achieve things that may not directly be connected to the person. He argues that a person's agency achievement refers to the realization of goals and values s/he has reason to pursue regardless of whether it is connected to his/her well-being or not.

Those who perceive themselves to have achieved well-being freedom work on achieving agency freedom (Sen, 1999). These are actions or activities that may not necessarily benefit the person but are beneficial to other people. The removal of substantial *unfreedoms* is constitutive of development. Each freedom helps promote other types of freedom to achieve development (*ibid.*).

The new technologies have an impact on well-being freedom and well-being achievements as well as agency freedom and agency achievement. As argued by Sen (1992), the expansion of choices is both an opportunity and a burden. For instance, the spread of information using the new technologies in case of emergency is very fast. If the recipient of the distress call chooses to assist, then their freedom and achievement goes up because they have helped. However their well-being freedom and achievement goes down due to the sacrifice in time and possibly money that they are forced to make in order to respond to the distress call.

2.3.4 Decision Making Process and Choice

Sociologists and political scientists have built theories around the idea that all action is fundamentally rational in character and that people calculate the likely costs and benefits of any action before deciding what to do (Boudon, 1997). This approach to theory is called rational choice theory. It is a psychological theory that explains persons'

actions in terms of mental state. A rational choice or action is one in which the agents take the best available action given their preferences and beliefs (*ibid.*).

The theory is individualistic in that it applies to individuals only. Perceptions and preferences are specific to individuals who can have different perceptions and preferences on the same things. Perception is the process of attaining awareness or understanding of sensory information (sight, hearing, touch, smell and taste). What one perceives is a result of interplays between experiences. Preferences on the other hand could be conceived as an individual's attitude towards a set of objects, typically reflected in an explicit decision-making process (Lichtenstein and Slovic, 2006). It is the evaluative judgment in the sense of liking or disliking something or an action (Scherer, 2006).

Decision-making processes can modify preference consciously or otherwise (Sharot et al., 2009). The reason that an agent chooses act X over act Y is that the outcome that is believed to follow from X is preferred to that which is believed to follow from Y. Perceptions and preferences inform the choice made.

2.3.5 Selection of Dimensions

The CA offers no systematic guidance as to how to choose capabilities or domains in different contexts (Alkire, 2002). However, the flexibility of the framework permits researchers to develop and apply it in different ways (*ibid.*). Sen does not propose or endorse a fixed list of capabilities but argues that the choice and importance of capabilities depend on personal value discretion, which is influenced by the nature and purpose of the exercise. He argues that people should decide what lists work best for them (Sen, 1992). Scholars such as Nussbaum (2000), Alkire and Black (1997), and Robeyns (2003) have proposed lists of capabilities (see Table 3).

Table 3: Lists of Capabilities by Various Scholars

Nussbaum (1995, 2000)	Alkire and Black (1997)	Robeyns (2003)
Application-Universal	Application-Universal	Gender inequality in western societies
High abstraction	High abstraction	Low abstraction
1. Life 2. Bodily health 3. Bodily integrity 4.Senses, imagination and thought 5. Emotions 6. Practical reason 7. Affiliation 8. Other species 9. Play 10. Control over one's environment	1. Life 2.Knowledge and appreciation of beauty 3. Work and play 4. Friendship 5. Self-Integration 6.Coherent self-determination 7. Transcendence 8. Other species	1. Life and physical health 2. Mental well-being 3. Bodily integrity and safety 4. Social relations 5.Political empowerment 6. Education and knowledge 7.Domestic work and non-market care 8. Paid work and other projects 9. Shelter and environment 10. Mobility 11. Leisure activities 12. Time-autonomy 13. Respect 14. Religion

Source: Robeyns (2005)

Although Nussbaum, (2000) insists that Sen should endorse one definite list stressing that her list is of highly general capabilities and is adaptable, the list remains general. Robeyns (2005) has argued that most of Nussbaum's capabilities are at such a high level of generality that undemocratic local decision making can lead to problematic lists and that some capabilities are harder to measure than others are. She further argues that not all evaluative exercises can be open to public discussion in the same manner and it is still unclear what criteria besides public inquiry there might be. Alkire and Black (1997) list with eight capabilities is regarded to be of high abstraction just like that developed by Nussbaum (2000). Robeyns (2005) has herself developed a list of 14 capabilities viewed to be of low abstraction.

The lists have social, economic and knowledge variants that are in line with suggested attributes of quality of life in this study. The variants in the three dimensions of development are discussed in chapter 5 while retaining open-ended development outcomes that do not presuppose individuals' choices.

Sen's ideas have invited general and specific scepticism (Nussbaum, 2000 and Robeyns, 2005). He has been reluctant, despite criticisms, to prescribe a list of *Functionings* to be taken into account, or an aggregative principle. He intended the CA to be used for a wide range of purposes, deliberately leaving it 'incomplete', rather than precise, and prescriptive, as most other development theories (Robeyns, 2005). He argues that such a formularized prescription will be questionable given the vastly discrepant circumstances, conventions, and social pressures that people face (Sen, 1999).

Scholars have also argued that the CA is too individualistic, and pays insufficient attention to groups and social structures. Robeyns (2005) has addressed the criticisms. She argues that Sen explicitly takes into account social environment, societal structures, and culture by recognizing the conversion factors from commodities to *Functionings*. The CA has provided an invaluable analytical and philosophical foundation to be built on (Evans, 2002).

Even so, Sen himself has pointed out that the Capability Approach is not equipped to account for the procedural aspect of freedom and justice, but focuses on the opportunity aspect (Robeyns, 2005).

This study uses Sen's model. It recognises the need for the capabilities to be subjected to public discussion and that they are context specific. For this reason, the study uses data comprised of 1291 low-income households to derive the capabilities and further subjected the capabilities to public scrutiny through a detailed survey focusing on three clusters in an urban setup to contextualise the capabilities as discussed in chapter 3 and 5. The study acknowledges that the conversion factors range from personal, social, and the wider environmental factors including the role played by the social structures and culture. However, the study focuses on conversion factors specific to individuals classified as demographic factors and personal factors as discussed at the end of this chapter.

2.4 Households' Dynamics and Environmental Influences

A typical household consists of several individuals with different characteristics and capabilities, which ultimately determine the social and economic capacity of the household as a unit. Households change compositions frequently through births, deaths, divorces, marriages, live-ins and the departure of children from home. Two households can join and merge into a new household such as when a widow and a widower get married. This implies that the positive or negative income changes of an individual household member may influence the household's living arrangements and the quality of life of its members. These have implications for the conceptualization of poverty and development.

In a critique of the contemporary social sciences, Douglas and Ney (1998) argue that many of the theories that dominate the analysis of poverty, welfare, and well-being operate without a theory of the person. Such a theory, they propose, would require a conception of the person as a 'social being'. The social being they argue is a product of relationships with other persons. Their contention suggests that relationships and communication are pivotal for the well-being of individuals. Doyal and Gough (1991) theory of human needs recognizes the significance of relationships and the heuristic by which it relates abstract basic needs to needs satisfiers. These are satisfied through interactions with close relatives and friends, through personal or impersonal contacts with representatives of the state, or intermediaries in the market, or other relationships (Gough and Chothia, 2004).

Usage of new technologies contributes to households' capability to participate in the potential benefits that the information society brings (Mann, 2003). It is a prerequisite for households to participate in 'digital democracies' and protects households' rights to access information and knowledge (*ibid.*). The new technologies are applicable to sectors ranging from education, livelihoods, healthcare, and service delivery by government, all directly linked to poverty alleviation. The ability of households to make

use of the new technologies to achieve the relevant *Functionings* is a function of their education, skills and exposure to the technologies (Mann, 2003).

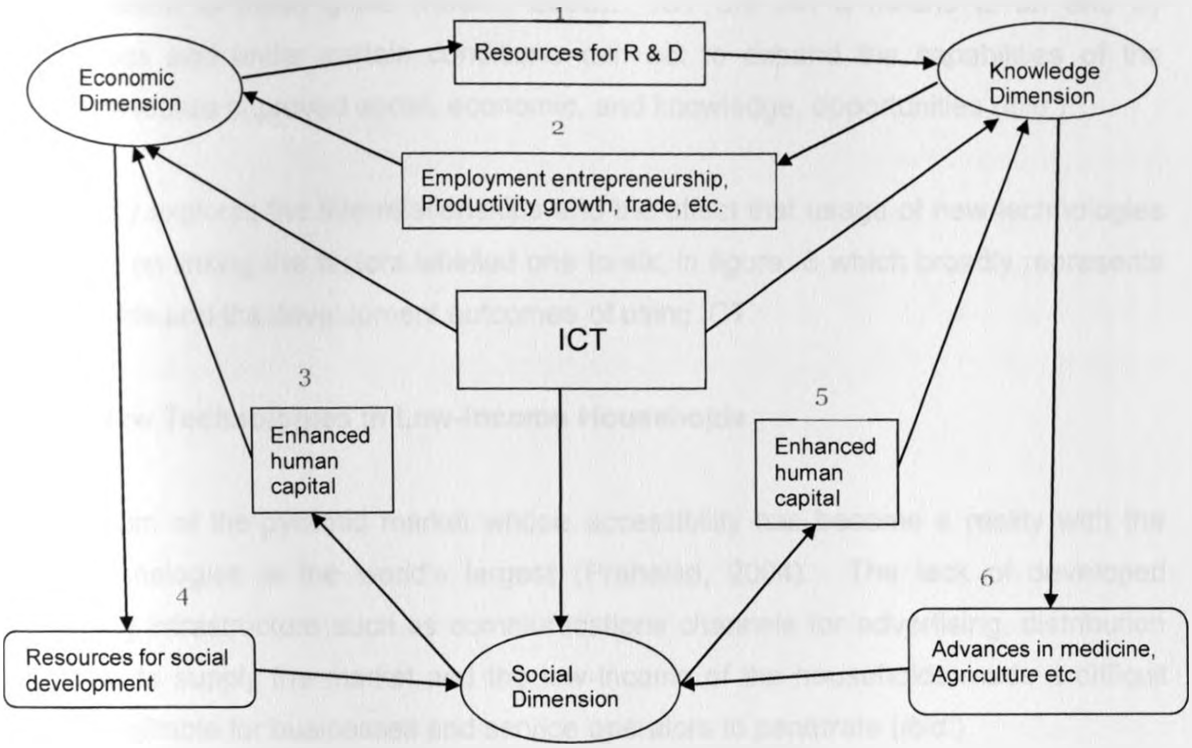
Gigler (2004) states that individual capabilities have six dimensions namely informational, psychological, social, economic, political and cultural while group or community capabilities have the same dimensions with psychological replaced by organizational. A household is a reflection of a group.

2.5 Role of the New Technologies in Development

There has been a significant debate on the extent to which investments in the new technologies affect social, economic and knowledge status of a household and by extension a country (Heeks, 2009). *"Billions of US dollars are invested each year by the public, NGO and private sectors in information and communication technologies for development (ICT4D) projects... Yet we have very little sense of the effect of that investment"* (*ibid.*).

The proponents of ICT overestimate their role in development and poverty reduction and emphasize on the supply (Sreekumar et. al., 2008). In addition to contributing to social and economic development, the new technologies are the key enablers of the knowledge society. Those who have access and make use of the technologies participate fully, while those without have fewer opportunities, and remain trapped in pre-knowledge forms of economic activities. The direct impact of the new technologies on one dimension is reflected as indirect impact on other dimensions, because of the extent to which the three dimensions are interrelated (Kauffman & Kumar, 2005) (see Figure 3).

Figure 3: Development Dimensions and New Technologies



Source: Kauffman & Kumar (2005)

The new technologies lead to greater productivity creating an economic impact. Higher productivity leads to the availability of additional resources for investment in research and development. This enables innovation and technological change, which affects the knowledge dimension. The availability of surplus resources leads to expenditures on leisure and an improvement in the quality of life, which affects the social dimension (*ibid.*). Socially, there is provision of convenient online services extending the reach of health, agricultural, education, and public information to inaccessible areas, leading to the improvement of the quality of life.

Sen's holistic approach to development is well suited to evaluate the potential effects of interventions using the new technologies considering that technologies are introduced into an existing and already complex web of mutual causality. Households that are seeking to make their livelihood and to maintain or minimize loss to their existing asset

base are likely to use the new technologies when they can do so in a way that provides a net benefit to these goals (Heeks, 2002). ICT are not a means to an end by themselves and under certain conditions can act to expand the capabilities of the people to realize improved social, economic, and knowledge, opportunities (*ibid.*).

This study explores the interrelationships and the effect that usage of new technologies is having on linking the factors labelled one to six, in figure 3 which broadly represents the benefits and the development outcomes of using ICT.

2.5.1 New Technologies in Low-Income Households

The bottom of the pyramid market whose accessibility has become a reality with the new technologies is the world's largest (Prahalad, 2004). The lack of developed marketing infrastructure such as communications channels for advertising, distribution channels to supply the market and the low-income of the households made it difficult and unprofitable for businesses and service operators to penetrate (*ibid.*).

However, mobile phones have become the communication and networking platform of choice for billions of the world's population at the base of the global economic pyramid. The low-income households adopt a shared access model as a way to make products more affordable. While they would prefer to own a mobile phone exclusively, they make price quality trade off. The development of low cost mobile phones is providing them with access and opportunities to use the mobile phones.

Waverman et al. (2005) demonstrated that in developing countries, for every additional 10 per cent increase in mobile phones penetration, annual GDP growth increases by 0.6 per cent. As mobile phone services are pulled increasingly into rural and low-income communities, they are riding on the strength of rapidly growing networks, low power and maintenance requirements, and increasingly affordable pricing (Lehr, 2007). Hart and London (2004) argue that success at the bottom of the pyramid often involves a new product that targets a new set of customers and is distributed using innovative

distribution channels. Kuriyan (2008) indicates that models for information and communication technologies for development are based on increasing the well-being of the poor using low cost but advanced technologies.

The high demand for the new technologies at the bottom of the pyramid was illustrated through a study by the World Resources Institute (WRI), which established that except in the very lowest bottom of the income pyramid, average spending on new technologies per household exceeds spending on water. In the upper bottom of the income pyramid, spending on new technologies sometimes exceeds spending on health (WRI, 2007).

Just like the sachet strategy was adopted in the fast moving consumer goods industry, mobile phone operators have come up with products for different market segments with a major concentration on low-income households. The mobile money services and small denomination electronic top-ups on prepaid mobile phones are packages targeting the low-income households in Kenya. Zainudeen (2008) established a shared mode of Internet and mobile phone access among the low-income households.

In 2007, Kenya pioneered the first mobile money transfer service, the M-PESA, now being replicated in other parts of the world. M-PESA, an agent-assisted, mobile phone-based money transfer system, was launched by Safaricom in 2007. The service was initially targeting low-income households who were 'unbanked'. As the service gained penetration in the market, the operator enlarged the target base. The action has enabled low-income households to feel part of the larger population and enjoy using services not viewed as targeting the poor.

M-PESA, allows users to store money on their mobile phones in an e-account and deposit or withdraw money in the form of hard currency at an M-PESA's agent. Safaricom's initial one-year target was 500,000 customers. Within one month, it registered 20,000 M-PESA customers. By the end of the year (2007), they had 2 million customers, more than four times their estimates. By March 2010, there were over 9

million registered customers (Safaricom, 2010). Other countries have started using M-PESA and partnership created with other money transfer services such as the Western Union. A recent innovation is the M-Kesho, a loan facility linking the mobile phone operators with the banking sector.

Although implemented with goals of serving the poor, the service has become a successful strategy to reach the broader mass market, including the wealthy segments of the country. Other service providers have introduced money transfer systems in the market such as the Zap money launched by Zain Kenya in 2009, YuCash launched by Yu in 2009, and the Orange money launched by Telkom Kenya in 2010.

Across the region, the French telecoms have launched the mobile money service in Ivory Coast, Madagascar, Mali, Niger and Senegal with the brand name Orange money. In Ghana, there is the Ecobank mobile banking in partnership with Zap.

2.6 Application of Capability Approach in ICT: Case Studies

The letter accompanying the 14 e-bulletin of the Human Development and Capability Association of June 2009 opened with the following statement. "*The question of operationalising the Capability Approach continues to be a thorny one for those who are trying to build an alternative economic approach to well-being measurement.*" Acharya and Deneulin (2009).

Alkire (2002) and Clark (2005) have pointed out the difficulties of effective operationalisation of the CA and in particular its notion of capabilities. Heeks (2009) notes that little has been done in operationalising Sen's ideas on capabilities and *Functionings* with respect to ICT4D and the literature on applying the CA to participatory evaluation of ICT4D initiatives is sparse, despite the reasonable body of work related to ICT and CA.

However, there have been attempts to operationalise the CA in the field of ICT despite the limitations. Madon (2004) used the CA as an evaluative space for assessments of e-government initiatives in India; AKshaya in Kerala and Bhoomi in Karnataka. She focussed on enabled *Functionings* through the initiatives, what people did with created opportunities, and barriers to achieving the *Functionings*. She found that the initiatives had enabled several capabilities and contributed to the empowerment of women. She concluded that it is the 'real opportunities and real achievement of *Functionings* that matters', rather than indicators associated with access and use.

Kleine (2009) developed the 'choice framework and applied it in exploring the use of ICT by micro entrepreneurs in Chile. She argued that the ICT gave the entrepreneurs more choices and demonstrated through a case study how a virtual meeting substituted a physical meeting that had been impossible for many years due to distance and financial implications. She notes that ICT expand people's choices.

Two other cases that attempted to operationalise the CA are analyzed below. Zheng and Walsham (2007) applied the Capability Approach in examining social exclusion in the e-society as capability deprivation in two hospitals in South Africa and Alampay (2006) applied the CA in analyzing social-demographic differences in the access and use of ICT in the Philippines.

2.6.1 Social Exclusion in the E-society

Zheng and Walsham (2007) used two empirical examples in the health sector; one based on the District Health Information System (DHIS) in rural South Africa (SA) and the other on the SARS epidemic in China. Of interest to this study is the District Health Information System case study. The project aimed at enabling citizens to have improved access, directly or indirectly, to education, information, and healthcare.

Zheng and Walsham explored information literacy in two hospitals based in SA. The data was collected through participatory observation, focus group discussions (FGDs),

and questionnaires. In Alpha, one of the hospitals, there was no documented information management system. There was no consistently documented information about the total number of admissions, discharges, and deaths on a monthly basis. In Beta, the other hospital, there were discrepancies in patient numbers from the admission registers, midnight censuses and the monthly reports. These discrepancies had passed unnoticed by the administration.

While the two hospitals had computers and computerized information systems, the hospital staff did not understand the purpose for which the information was collected and the use of the graphs that were drawn out of the information. The information officers in both hospitals felt isolated and helpless with computers they found complicated to use. They further felt disrespected and their work not valued. Though the computers were supposed to make work more valuable and enhance the capabilities of the health workers, this was not happening. The authors showed that rural hospitals seemed to be included in the DHIS yet effectively excluded from benefiting from the health information, which they took part in collecting, largely due to the level of information literacy of the local people. This form of exclusion or unfavourable inclusion, in turn contributed to the deprivation of quality healthcare in the areas.

Using the Capability Approach, Zheng and Walsham (2007) argued that people should look at poverty not only as lowness of income but also as 'impoverished lives'. This includes deprivation of the freedom to be involved in important activities that one might wish to be involved. They noted that social exclusion is primarily concerned with the deprivation of opportunities. They demonstrated that social exclusion as capability deprivation in one space is often related to capability deprivation in another space and social exclusion of one group of people may cause capability deprivation in another group. They illustrated how inequality and social exclusion in the e-society are partly rooted in the capability to access and use information.

Zheng and Walsham (2007) showed how CA allows a reflection on social exclusion in the e-society, examining how commodities such as computers and information systems are converted to capabilities and opportunities for individuals to live in ways they consider meaningful and valuable. The capability deprivation partly due to low information literacy is summarised (see Table 4).

Table 4: Analysis of Application of Capability Approach

Commodities	Agents	Conversion Factors	Capability Deprivation	
			Well-being freedom	**Agency freedom**
• Computers • Health information system	• Health workers • Information officers	• Information literacy • Understanding the value of info and knowledge • Capability to access and use information • Institutional support for using information	• To help patients without contracting disease	• To take advantage of computer technology • To be able to collect and exploit information • To be included in the district health information system • To be connected to the resources on the Internet • To effectively perform better health care
	• Patients	• Income • Heath facilities • Distance to facilities	• To live in an environment without devastation from epidemics • To receive quality health care	

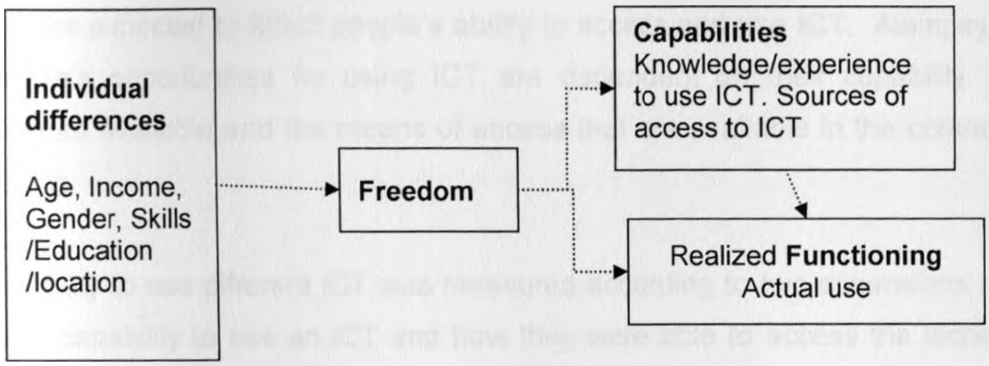
Source: Zheng and Walsham (2007)

2.6.2 Social-Demographic Differences in the Access and Use of ICT.

Alampay (2006) applied the CA in a research focusing on two locations in the Philippines namely Carmona, a semi industrial municipality, and Puerto Princesa city, an island province detached from Luzon Island. The survey used the CA to evaluate

the implementation outcome of universal access to ICT policies and strategies. He investigated the real opportunities available for households to access ICT, the characteristics of people who use and do not use the facilities and the reasons for using (see Figure 4).

Figure 4: Capability Approach in ICT



Source: Alampay (2006)

Alampay examined what access to ICT means to people and how access or lack of access affects them. The sampling frame ensured a representation of both urban and rural households using the records from the municipality and their classification of urban and rural while considering gender.

A focus group discussion (FGD) was conducted in Carmona composed of five men and four women aged from 18 to 45 to explore people's need for and use of ICT. This validated the literature findings on the digital divide and information was used to develop the survey instrument. The FGD highlighted themes or issues that were then incorporated in the survey instrument.

The design incorporated concepts from the CA. This included freedom pertaining to choice that involves the processes that allows freedom of actions and decisions as well as the actual opportunities that people have given their personal and social

circumstances. People's capabilities and opportunities to make use of ICT in their communities were determined.

The study demonstrated that relying solely on national indicators of access could be misleading since they do not reflect the different social-demographic compositions of a nation. There was need to measure universal access from the demand side. Social factors were expected to affect people's ability to access and use ICT. Alampay noted that people's opportunities for using ICT are dependent on their capability to use infrastructure available and the means of access that are available in the communities they belong.

The capability to use different ICT was measured according to two dimensions namely the actual capability to use an ICT and how they were able to access the technology. Respondents were asked about their use of ICT over the past immediate year and their purpose for using.

Some of the outcomes showed that the diversity in a location's topography and differences among people complicated access, with income and remoteness being critical barriers. Personal values played a role in the level and nature of perceived needs for ICT, payment option and the preferred mode of use. In isolated areas, distance and lack of infrastructure were the biggest hurdles while in more developed areas, social issues such as lack of motivation, skills and knowledge hampered people's perception of how ICT could benefit their lives.

Alampay (2006) further found that people who were younger, more affluent, well-educated and lived in areas with better infrastructure tended to have better access and were more capable of using ICT. Wireless options such as mobile phones were found instrumental in bringing access to remote areas. Innovative payment options like the prepaid and technologies such as SMS enabled people to find the use of ICT more affordable and payment less restricting.

2.7 Conclusion and Lessons from the Literature Reviewed

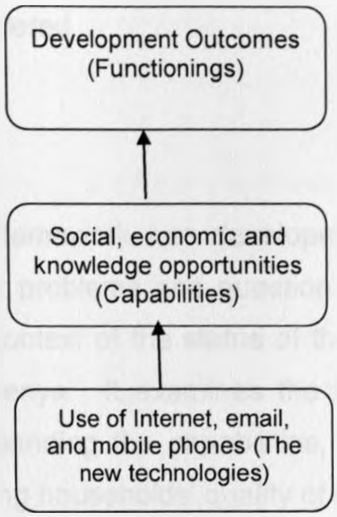
Heeks (2002) argued that utilization of the flow of information and the channels of communication, which potentially enhance people's freedom to pursue a life that they have a reason to value, including participating in economic, social, and political activities, is crucial in the e-society era. Kirkman (1999) notes that to be useful, any technology must be placed within the local context of capabilities and needs.

As illustrated by Zheng and Walsham (2007) social exclusion in the e-society can manifest in different forms under different conditions as deprivation of different capabilities. There is a need to move beyond the distribution of ICT among the population and address the inequality of social-economic status. This includes exploring factors that hinder effective and efficient utilization of ICT for effective information management.

From the literature, low-income households use new technologies to improve their quality of life in different ways. The rapid dispersion of the Internet and mobile phones to all parts of the world has discredited the general assumption that the focus of low-income households is basic needs such as food and shelter with no interest on enabling goods and services. The literature showed that the low-income households adopt a 'shared access' model as a way to make products and services more affordable. However, emphasis has not been placed on their capabilities enhancement due to use of the new technologies but on material and economic changes without a holistic approach to all the outcomes derived from the usage. The emphasis has also been placed on access rather than usage (Alampay, 2006).

There is little focus on the role of the conversion factors and choice in determining the development outcomes derived from usage of new technologies. Preferences and perceptions in relation to ICT usage are not given much emphasis too in the cases that attempted to operationalise the CA. This study notes a missing link between usage of the new technologies and the derived development outcomes (see Figure 5).

Figure 5: Missing Link: Use of New Technologies to Development Outcomes



While the new technologies provide households with capabilities (opportunities) in the social, economic and knowledge dimensions, they make different choices in relation to how they utilize the opportunities resulting to diverse development outcomes. Further, usage of the new technologies at the household level is influenced by different factors ranging from demographic factors, personal characteristics, social norms and environmental conditions among others. Establishing the missing link between the households' usage of the new technologies and the development outcomes, which involves investigating the conversion factors, involved and how they interrelate; and the role of choice in utilizing the enabled capabilities to derive valued development outcomes will lead to achievement of the study objectives.

The Capability Approach is suitable for this study because while it is individualistic given its focus on capabilities and *Functionings*, it takes into account social structures and the wider environment through the conversion factors (Robeyns, 2006). Further, Capability Approach focuses on beings and doings in both market and non-market settings of well-being which address the needs of the low-income household in addition to recognizing individual's differences physically, emotionally and other aspects such as the way they value and use goods and services. The study notes that using capabilities as evaluating space may lead to bias based on the settings. For instance since the focus

of this study is on low-income households, they are disadvantaged in monetary terms hence their financial capabilities are already lowered.

2.8 Research Conceptual Framework

To meet the study objectives, a conceptual framework was developed based on the reviewed literature and informed by the study problems and question (see Figure 6). The framework situates the study within the context of the status of the usage of new technologies by low-income households in Kenya. It examines the role of the new technologies as catalysts in forming and expanding the capabilities, which are then converted to development outcomes determining households' quality of life.

The conceptual framework was informed by ideas from several scholars discussed earlier in this chapter. Sen's five distinct freedoms, the three lists of capabilities (see Table 3), Gigler (2004) human development capabilities, Kauffman and Kumar (2005), Robeyns (2005), and Alampay (2006) models.

Sens's five distinct freedoms are political freedoms, economic facilities, social opportunities, transparency guarantees and protective security (Sen,1999). From Sen's freedoms, economic facilities and social opportunities are reflected in the economic and social dimensions of development. Protective security refers to a feeling of security, which is linked to social opportunities. Transparency guarantees refers to access to information through legal and acceptable means which leads to knowledge accumulation hence knowledge dimension of development. These four freedoms contributed to the framework with the security protection coming under the social opportunities.

The three developed capability lists (see Table 3) relate to the person's well-being with Nussbaum's list extending to include psychological and environmental factors. From the lists, the study used aspects that relate to social, economic and knowledge well-being of the person to inform the framework.

Gigler (2004) placed human development at the centre of analysis. He developed five human development capabilities namely informational, psychological, social, economic, political and cultural. From Gigler's list the indicators of the three dimensions of development, specifically, the social, economic and informational informed the framework. As noted earlier, the three dimensions of development, that is, social, economic and knowledge were selected for the study due to their interrelationship with each other and the fact that effects of the usage of the new technologies in one dimension has a direct effect on the other two dimensions ultimately influencing the quality of life of the person. Kauffman and Kumar (2005) model, showed the interrelationships between the social, economic and knowledge dimensions of development. While he called the technologies ICT, this study refers to them as the new technologies. The linking factors such as enhanced human capital and employment entrepreneurship and productivity broadly forms the list of capabilities enhanced by the new technologies that this study is investigating.

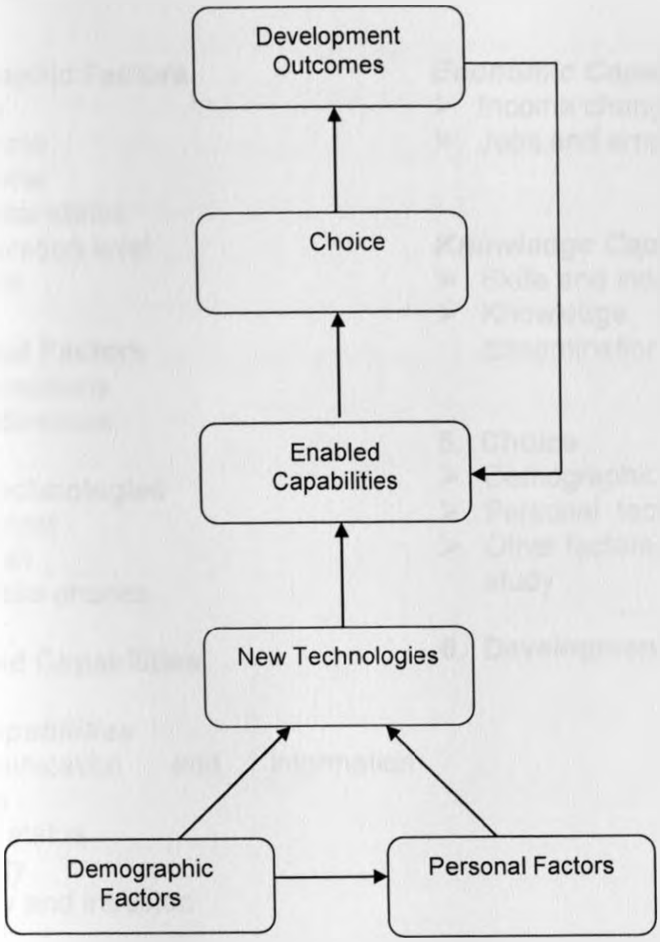
Alampay (2006) informed the study methodology from his use of FGD to develop themes for the survey whereas in this study, an existing secondary database, RIA (2007) database was used to derive the initial set of enabled capabilities. The study adopted a modified version of Robyens (2005) model. She argued that capability generation is influenced by personal, social and environmental factors. Robyens has individual conversion factors that consist of personal characteristics, social context, social and legal norms, other people's behaviour and characteristics; and environmental factors. She has further shown the role of choice in influencing the development outcomes informed by preference, social influence, personal history and psychology. This study focuses on the individual conversion factors, narrowed to demographic and personal factors and examines how they influence usage of the new technologies and conversion of the enabled capabilities to development outcomes.

The study limits the demographic factors to age, gender, marital status, income, education and skills while personal factors are limited to perceptions and preferences.

The framework recognizes that the ultimate derived development outcomes are based on decision-making process informed by individuals' personal history, psychology, social norms, culture and the wider environment as argued by Robeyns (2005). The enabled capabilities are converted to diverse development outcomes based on the choices made. The study argues that choice is an outcome of a decision making process that mediates the conversion of enabled capabilities to development outcomes. The study narrows the influence of choice to demographic and personal factors only, while acknowledging the role of other factors that influence the decision making process such as individuals' personal history; psychology, social norms, culture and the wider environment (Robyens, 2005), leading to choice.

The framework is derived from synthesis of background to the study, study problem, objectives, and the scope in addition to the literature reviewed (see Figure 6).

Figure 6: Conceptual Framework



2.8.1 Explanation of Framework

1.Demographic Factors
- Age
- Income
- Gender
- Marital status
- Education level
- Skills

2. Personal Factors
- Perceptions
- Preferences

3. New Technologies
- Internet
- Email
- Mobile phones

4. Enabled Capabilities

Social Capabilities
- Communication and information access
- Social status
- Security
- Privacy and intrusion

Economic Capabilities
- Income change
- Jobs and employment access

Knowledge Capabilities
- Skills and individual productivity
- Knowledge accumulation and dissemination

5. Choice
- Demographic factors
- Personal factors
- Other factors-out of scope of the study

6. Development Outcomes

2.8.2 Components of Conceptual Framework

Demographic Factors

Six demographic factors are examined namely age, income, gender, marital status, education, and skills. The study argues that these factors influence usage directly while at the same time influence perceptions and preferences as demonstrated through the arrow from demographic factors to personal factors. Section 4.3.1 discusses the role of demographic factors in influencing usage of the new technologies.

Personal Factors

The study limits personal factors to perceptions and preferences, which are embedded in a person and could change instantly based on the circumstances and the context. The study argues that perceptions and preferences are influenced by a combination of the demographic factors, ultimately influencing the usage of the new technologies as discussed in section 4.3.2. For instance, the age or gender of a person may influence their perceptions and preferences on the various aspects of the technology. However, people of the same age or gender may have different perceptions and preferences over the same issue or choice of technology features leading to different decisions and choices as demonstrated in tables 14 and 15 in chapter four.

The study acknowledges that perceptions and preferences are informed by factors such as individuals' personal history, psychology, social norms, culture and the wider environment, which are out of scope of this study. They all influence the choices individuals make in relation to conversion of the enabled capabilities to development outcomes as discussed in section 5.4. The study notes that decisions made on the usage of the new technologies by individuals are based on their perception of the role the technologies should play in enhancing their quality of life as discussed in section 6.5.

The New Technologies

New technologies (Internet, email and mobile phones) are goods or services that contribute to production representing means as per Sen (1992). Their role in social, economic and knowledge dimensions of development is investigated in this study. The study premises that usage of the new technologies is influenced by demographic factors and personal factors among other factors. The new technologies help in the formation and expansion of capabilities that leads to development outcomes based on the usage and choices made at the point of converting the enabled capabilities to development outcomes as discussed in section 5.4.

Enabled Capabilities (Capability Set)

This is a set of capabilities based on opportunities in the three dimensions of development and enhanced by the contribution of the new technologies in social, economic and knowledge development. Eight enabled capabilities were derived from RIA (2007) database and reviewed literature (see Table 2) as explained in section 3.2.2 and section 5.2. As mentioned earlier, the eight enabled capabilities were subjected to public scrutiny through a detailed survey that targeted the low-income households from three clusters based in Nairobi.

Choice

The demographic and personal factors influenced the usage of the new technologies leading to eight enabled capabilities as discussed in section 5.3. Choice, which is a product of decision making process, and dictated by the demographic and personal factors, largely informed by personal history, psychology, social norms, culture, and the environment among others, mediated the conversion of the enabled capabilities to development outcomes. The factors informed and complemented the demographic and personal factors in making choices with their combined role dictating the ultimate choice made as discussed in section 5.4. The focus of this study is the role of the demographic and personal factors in influencing usage and derived development outcomes while acknowledging that the ultimate choice is based on a combination of many other factors that are outside the scope of this study.

Development Outcomes (Functionings)

Development outcomes refer to observable or felt individuals and households' status because of using the new technologies. They are the "beings" and "doings" due to use of the new technologies. The study considers *Functionings* to be those achieved and referred to them as development outcomes. The development outcomes could be positive or negative ultimately dictating the quality of life as discussed in section 6.3. The development outcomes further influence the capabilities, enabling and expanding the capabilities as shown through the feedback arrow from the development outcomes

to the enabled capabilities. Enabled capabilities present more opportunities to the low-income households.

2.9 Hypotheses

Within the framework, the study investigated the development outcomes of using the new technologies in low-income households. From synthesis of chapter 1 and literature reviewed which informed the study framework, three hypotheses were formulated that guided the data analysis and flow of arguments throughout the thesis.

1. Usage of new technologies is influenced by demographic factors namely age, income, gender, marital status, education level, and skills.
2. Usage of new technologies is influenced by personal factors namely preferences and perceptions.
3. Development outcomes of using the new technologies are dictated by choice influenced by interactions of demographic factors, personal factors and other factors out of scope of this study.

Chapter 3:

Research Process

3.1 Introduction

Research process also referred to us research methodology in some literature involves ordered set of activities focused on the systematic collection of information and use of accepted methods of analysis as a basis for drawing conclusions and making recommendations. It is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the study purpose linking the study problem and objectives to the conclusions and recommendations.

This chapter documents the methods used to carry out the study and to derive the findings. It details the process used in conducting the study including the field process and the methods used for data analysis. The study used a secondary database on ICT access and usage at the household level referred to as RIA (2007) database, complemented by primary data collected through a survey referred to as survey (2010).

3.2 Research Design

Research design is the argument for the logical steps taken to link the study question and objectives to data collection, analysis and interpretation in a consistent way. According to Yin (1994), a research design is a blue print of the study. It is the logic that links initial questions of study, the data to be collected and the conclusion to be made. The study used a mix of qualitative and quantitative data obtained from primary and secondary sources.

The study question, objectives, and the theoretical framework, discussed in chapters one and two guided the study. They further guided the selection of the variables that were analysed from the RIA (2007) database and the design of the questionnaire for the survey (2010). The researcher acknowledges that this is not a panel study

(longitudinal) and the households selected for the survey (2010) were not necessarily the ones targeted for the RIA (2007) study. Development outcomes were derived from qualitative data. The three formulated hypotheses guided the data analysis, interpretation and reporting of findings.

3.2.1 RIA (2007) Study and Database Access and Use

The researcher was involved in the RIA (2007) survey that examined ICT access and usage at the household level from the piloting of the data collection tool at the design stage to the data collection and cleaning. This was done between April and September 2007 during which time the PhD research topic was being formulated. The field process experience enriched the researcher's knowledge of usage of technologies across the country, and generated an interest of studying the sector.

Once the data was collected and cleaned it was sent to Research ICT Africa (RIA) for consolidation with data from 16 other African countries. In September 2008, the researcher requested access and usage of the database for her PhD and the request was granted.

The RIA (2007) database consisted of 1461 households. Of the households, 1291 had an income of Kshs. 23,671 and below which is the current classification of low-income households as per KNBS (2008). This study uses the data from these households, complemented with a survey, discussed later in this chapter.

3.2.2 Refining the Study Topic: Role of RIA (2007) Database

The study started with a broad research topic and questions. This was refined through the review of literature and meetings with the supervisors. Continuous literature review and analysis of data from the RIA (2007) database helped in narrowing the study topic to development outcomes of using the Internet, email and mobile phones to low-income households' quality of life. The study scope was also narrowed to the social, economic

and knowledge dimensions of development. Analysis of the databases helped in refining the study questions and objectives and influenced the decision to have a complementary detailed study of three low-income clusters based in Nairobi as a case study.

To determine the low-income households, meetings held with the Kenya National Bureau of Statistics (KNBS) staff[4] enlightened the researcher on the classification of households into income groups. By then, KNBS was in the process of changing the classification from the five categories namely 1-Upper Class, 2-Upper Middle Class, 3-Middle Class, 4-Lower Middle Class, and the 5-Lower Class to three broad categories. The new classification has; the lower income group with a gross monthly income of below US$ 315.60 (Kshs. 23,671), middle income group with a gross monthly income of between US$ 315.60 -1,600 (Kshs. 23,671 - 120,000) and the upper income group with a gross monthly income of above US$ 1,600 (Kshs. 120,000). They provided a listing of all the clusters in Nairobi with their classification into the previous five categories. The study was settled on the clusters in lower middle class (4) for the survey (see Table 1).

The data was analyzed using Statistical Package for Social Sciences (SPSS). The data used from the database was limited to the usage of Internet, email and the mobile phones in low-income households. Income of less than Kshs. 23,671 was used to determine the low-income households as per the latter classification (KNBS, 2008). The final secondary database that was valid for this study had 1291 households, which excluded households with an income of more than Kshs. 23,671. Descriptive and analytical statistics were used to analyze the data. Descriptive statistics included mean, medium and standard deviation, which helped in understanding the data. The analytical statistics involved measures of relationships, which were limited to correlation and regression analysis.

[4] The staff were the senior manager NASSEP and field administrator, a technical officer, a statistician/econometrician and CPI technical officer.

From the RIA (2007) database, this study analyzed the relevant variables, which informed the initial set of enabled capabilities through the use of the new technologies (see Table 2). These capabilities were derived from analyzing a question that asked the respondents to indicate what the new technologies had enabled them to do, deriving the eight enabled capabilities.

Supported by literature reviewed, the study projected the expected changes due to use of the new technologies, and mapped the changes to the expected development outcomes. This helped in developing the indicators of the development outcomes. For instance, in the case of the capability of communication and information access, the study examined the projected changes due to enhanced capabilities through the use of the new technologies and referred to them as the predicted development outcomes. For each of the development outcomes, the study listed indicators that would symbolize the change. The process was followed for the eight enabled capabilities (see Table 5).

The indicators informed the design of the questionnaire tool for the survey (2010) that was used to collect the primary data focusing on three clusters based in Nairobi as the case study.

Table 5: Development Dimensions and Outcome Indicators.

Enabled Capabilities	Opportunities in Household Capabilities due to New Technologies	Development Outcomes (*Functionings*)
Social Development		
a) Communication and information access.	➢ Effective and efficient communication with family, friends, and business associates.	- Enhanced social Integration
	➢ Unlimited Information access	- Better informed households
		- Information overload
	➢ Unlimited entertainment 24/7	- Time wastage on new technologies
b) Security	➢ Access to security agents in case of emergency	- Enhanced security
		- More effective and efficient response to emergencies
	➢ Money transfer and storage	- Enhanced security of money transactions
	➢ Secure place for storing documents through scanning and uploading	- Enhanced security of documents

Enabled Capabilities	Opportunities in Household Capabilities due to New Technologies	Development Outcomes (*Functionings*)
	➢ Scams through the new technologies	- Increased resource wastage due to scams
	➢ Theft of mobile phones and data modems	- Increased theft of new technologies
c) Social status	➢ Enhanced dignity	- Enhanced confidence and sense of importance
		- Widened social divide
		- Increased spending on new technologies
d) Privacy and intrusion	➢ Ability to choose friends and business associates to relate with using the technologies	- Increased ability to decide when to relate with friends and business associates.
	➢ Infringement of households' right to privacy and intrusion when technology is wrongly used	- Increased unauthorized access or dissemination of information
	➢ A sense of being controlled and monitored by employer	- Enhanced monitoring and control of employees by employers
Economic Development		
e). Income	➢ Access to local and foreign Jobs	- Increased income

Enabled Capabilities	Opportunities in Household Capabilities due to New Technologies	Development Outcomes (*Functionings*)
change	➢ Effective and efficient contact with clients and	- Increased sales
	➢ Un expected expenses	- Lower net Income
f) Job and Employment access	➢ Employment in Internet and mobile formal sector	- Increased HH members employed
	➢ Access to Job through the new technologies	- Increased/reduced job opportunities
	➢ New Job opportunities from the new technologies by-products	
	➢ Job losses/ upgrades/absenteeism	
Knowledge Development		
g) Skills and individual productivity	➢ E-learning opportunities	- Enhanced skills
	➢ Introduction of new ways of working and service delivery i.e. E-banking, M-banking and tele-working	- Enhanced service delivery
h) Knowledge accumulation and dissemination	➢ Ability to share Information and knowledge by HH	- Increased local knowledge created

Source: (Synthesis of RIA (2007) database and literature reviewed)

3.3 The Survey (2010) Overview

The survey (2010) tool was informed by the findings from the analysis of the RIA (2007) database. The survey collected in depth data on the identified enabled capabilities. For each of the eight enabled capabilities derived from the RIA (2007) database, a question was asked to establish the development outcomes derived from the usage (see Table 5). The questions for the survey were derived from the indicators and focused on usage of the new technologies in the social, economic and knowledge dimensions of development, factors influencing the usage, households' perceptions of a good quality of life and the roles they felt the new technologies played in achieving their desired quality of life (see Appendix 1).

3.3.1 Data Collection Process

The survey data was collected in February 2010. The researcher, with the help of a research assistant collected the field data. In addition to the hard copy questionnaire, the research assistant used a tape recorder to complement the survey questionnaire. The reason for the researcher actively participating in the field process was to ensure that the sampling procedure was followed. Further, the use of the tape recorder by the research assistant ensured that information from questions that required qualitative information was accurately captured. This helped in counter checking and ensuring that all that the respondents said was captured in an accurate way. After the field work, the tape recordings were transcribed.

Sampling Frame

The survey (2010) focused on sixty households from three clusters in Nairobi, within the Fourth National Sample Survey and Evaluation Program (*NASSEP IV)* sampling frame that has 1,800 clusters. The consumer price index (CPI) survey, a product of KNBS has classified clusters into different socio-economic groups from where low-income households were selected as discussed in chapter 1 (see Figure 1).

A household constituted of a person or group of persons, irrespective of whether related or not, living together in the same housing unit, having common cooking arrangements, and sharing financial resources (Mathias, 2008). The household members had different characteristics, including economic and social capacity, which ultimately determined the social and economic capacity of the household as a unit.

The clusters targeted were those inhabited by low-income households, which constitute 72.12 per cent of the Nairobi urban households as per the consumer price index classification (KNBS, 2008). Three clusters were targeted for the survey, which interrogated further the enabled capabilities brought out by the RIA (2007) database.

Selection of Clusters

With the help of senior manager NASSEP and field administration at the KNBS, the study selected three clusters from 15 clusters in Nairobi targeted for the RIA (2007) survey. The selected clusters purposefully fell under the lower middle class (4) in the old KNBS classification (see Table 1). While the lower income group which consisted of 3- Middle Class, 4-Lower Middle Class, and 5-Lower Class were classified as having households with income of less than Kshs. 23,671, the focus of lower middle class 4 ensured that households in the clusters selected used a combination of the Internet, email and mobile phones. This was informed by the analysis of the RIA (2007) data where the findings showed that in the Lower Class (5), households did not use the Internet and email. Most households in the cluster classified as Middle Class (3) had an income of more than Kshs. 23,671 despite being classified as lower-income group in the new classification. Informed by these facts, the study narrowed to households in clusters classified as Lower Middle Class (4).

Using the above criteria, three clusters were targeted for the survey (2010). Other considerations taken into account were accessibility of the households in the cluster and a balance between formal and informal sector employees' settlements. The three clusters selected were Ofafa I, Umoja II and Riruta Satellite.

Background of the Sampled Clusters

Ofafa I

Ofafa 1 cluster is in Maringo location, Makadara constituency. Makadara is one of the eight constituencies of Nairobi province consisting of central and south of central areas of Nairobi. The houses in the cluster are owned by the city council. However, there are other informal houses built within the estate. The rent was uniform with original owners paying Kshs. 1,260 to the city council while they rented out rooms or makeshift houses in front of the main houses for between Kshs. 2,000 to 5,000. The heads of the households were a mix of young people in employment and older people mainly original owners who were subletting the houses and were in retirement living on pension but also running business within the estate.

Umoja II

Umoja II cluster is in Umoja location, Embakasi constituency, a suburb of South-East Nairobi. It is located 15 km from the central business district. The rent for the houses ranged between Kshs. 4,000 and 8,000. The cluster had many buildings under construction but without any clear structured plan. Most of the residents in the cluster were self-employed in small-scale businesses operating from the environs.

Riruta Satellite

Riruta Satellite cluster is in Dagoretti constituency, in the western suburb of Nairobi. The rent for the houses ranged between Kshs. 1,800 and 12,000. The reason for the large range was that the cluster has been urbanizing with time with original occupants having permanent structures while the new tenants' mainly casual laborers rented small houses constructed by the owners of the permanent structures. Most of the residents were casual workers or small-scale business owners.

Piloting of the Survey Tool and Modifications

The survey (2010) tool was piloted in four households in Ofafa 1 cluster, which had 77 households as per the KNBS maps. To identify the four households for piloting, the total number of households was divided by 4 to get an interval of 19 (77/4). The first household selected was house number one from the maps and an interval of 19 was used to select the other three households subsequently.

During the pilot, the researcher noted that the respondents were not comfortable with the questions related to income. Further, because the low-income households did not have consistent income per month, and most of their work was paid on daily or weekly basis, it was challenging for them to give a monthly figure of income. Meyer et al. (2009) documented the extent to which income was underreported in households' surveys. This prompted a decision to use the expenditure figure as the proxy for income as has been done in household surveys, detailed by Aguiar and Bils (2009). Pissarides and Weber (1989) argued that there are tendencies for the informal sector and the self-employed to misrepresent their earnings. The study gathered data on income and expenditure for comparison and to interrogate where large inconsistencies were observed. The questions on income and expenditure were shifted to the end of the questionnaire to ensure good rapport before tackling them.

Through the piloting, the researcher further noted that some food items that had been assumed common were not that common and indicating zero expense for each made the respondents uncomfortable. They included food items such as pasta, rice and chicken. Instead, categories of food items were created namely staple food, fruits and vegetables, soft drinks and animal products, and respondents specified the actual food consumed and cost in each category. A separate category for energy was created after realizing that majority of households were using a combination of kerosene and charcoal and very few were using cooking gas. Since the question on expenditure was itemized, the respondents willingly gave the exact figures in terms of expenses. In addition, by the time we got to the income and expenditure questions, we had gone through the details of all the household members and therefore inconsistencies in

relation to expenses were easily identified and follow up questions were asked to adjust the data accordingly.

Sampling Households and Field Procedures

Survey (2010) focused on a sample size of 60 households, 20 per cluster. The sampling was done from a normal distributed population. As indicated earlier, a subset of three clusters was selected from the low-income clusters targeted in the RIA (2007) database. From the three clusters, households were randomly selected. This ensured normal distribution of the data. The households selected were not necessary the one selected for the RIA (2007) survey. The study used the KNBS maps to understand the structure and the dimensions of the clusters.

As noted earlier, Ofafa 1 cluster had 77 households. To select 20 households randomly, 20 divided the number of households, establishing a sampling interval of 4 households (77/20). Umoja II cluster had 137 households. The number of households was divided by 20, establishing sampling interval of 7 households (137/20). Riruta Satellite had 122 households. The number of households was divided by 20 establishing a sampling interval of 6 households (122/20).

The researcher worked with a research assistant in the field. Each day the study targeted 10 households, five per person. The research assistant used a tape recorder as a backup to complement the paper survey questionnaire as indicated earlier. Each questionnaire took on average 55 minutes. To establish the starting point, the arrival time at the cluster was used to select the first household. For example, if the arrival time was at 0830, then the 11^{th} household as per KNBS maps would be the starting point (0+8+3+0=11). The next household would be 11 + X. (Where X is the interval).

Field Experience

After introducing ourselves and what the study was about, most respondents assumed that we were from a mobile phone operator and they wanted us to facilitate reduction of tariffs. This misconception was however clarified as the study continued.

Due to security reasons, the study team hired local agents to guide them through the clusters. The security agents monitored their movement between the households to ensure their physical well-being. However, there was no incident throughout the fieldwork and the respondents were helpful and willingly introduced the team to the next targeted household based on the maps and the sampling interval.

3.4 Data Management

3.4.1. Data Entry and Cleaning

Quantitative data was entered in a Statistical Package for Social Sciences (SPSS) database while qualitative data was entered into an excel database; this was checked for completeness and consistency. Data from the tape recorder was transcribed and cross checked with what had been recorded in the paper survey tool.

Data cleaning involved identification of gaps and inconsistencies. Once identified, a visit or a call was made since the mobile phone numbers of the respondents was noted during the field visits.

3.4.2 Coding and Classification

Coding quantitative questions involved assigning numerals to answers so that responses could be put in a limited number of categories or classes where applicable. The process ensured mutual exclusivity. For quantitative questions requiring Yes/No, they were coded as zero and one (0 or 1). For the qualitative questions, responses were classified into topics after which categories that informed themes were developed.

Classification involved summarizing and arranging the data in a logical order to facilitate analysis using the methods identified. Frequency and cross tabulation tables were generated which helped in understanding the data.

3.5 Data Analysis Procedures

Qualitative and quantitative data was analysed through different methods as detailed in this section.

3.5.1 Qualitative Data

Qualitative data focused on the development outcomes of the new technologies and the attributes of quality of life in the social, economic and knowledge dimensions of development. To analyze the qualitative data, the study used the framework based approach proposed by Ritchie et al. (2003). The framework consists of classifying and organizing the data into a thematic framework based on key themes, concepts, and categories. The main themes were subdivided into a succession of related subtopics and the data from each household was synthesized and placed under the appropriate subtopic of the thematic framework. The relevant data to particular themes was linked to the household source. Where verbatim quotes are used, the study uses endnotes to link the quote to the household source.

The development outcomes were classified as positive and negative development outcomes as recorded from the interviews since the question specifically asked for positive and negative ways that the Internet and mobile phones influenced their quality of life. The segmented data was grouped in a meaningful way by looking for connections between the segments. A descriptive name was used to label the segments that were later used to create topics. The various identified topics were categorized after which themes were created resulting to twelve development outcomes.

Households' responses on the key attributes that in their view constituted a good quality of life were listed against the households, noting the most mentioned. A tally of the attributes given was done and nine attributes were most mentioned. The study took them as the household's perceived key attributes of good quality of life.

3.5.2 Quantitative Data

The quantitative data was analyzed through measures of central tendency and measures of relationships.

Measures of Central Tendency

This showed the distribution of data across the variables. Mean, median, and the standard deviation of the data across the variables were computed. The skewness of the histograms from the data helped in interpreting the results.

Measures of Relationships

The relationships between variables and usage were measured using cross tabulations, correlations, and regression models. Pearson's chi square tests of significance values were determined. The p-values obtained from the tests were measured at 95 per cent confidence level to determine the significant level of influence of the variables. Pearson's chi-square (X^2) defined as the sum of the squared differences between the observed frequency (O) and the expected frequency (E) divided by the expected frequency (E) was used to calculate the p-values of the factors that influences the perceptions and preferences.

$$X^2 = \sum (O-E)^2/E$$

The decision rule was that if the calculated X^2 was greater than the tabulated X^2, the null hypothesis was rejected (Wayne, 2010).

Binary logistic regression models established the strength of variables in influencing the usage of the new technologies. They predicted the odds of usage of the new technologies and the odds of a development outcome based on the values of the demographic variables. The regression coefficients were used to estimate odds ratios for each of the independent variables in the model. *Nagelkerke* R^2 was used to show how well the model explained the variance. A high R^2 value was an indication that the regression model explained the variation of the dependent variable to a high percentage.

The variables in the models are interpreted based on the sign and the magnitude of the regression parameters (see Table 6).

Table 6: Variables' Description

	Variable	Variable type	Coefficient	Description of variables
	Constant		+	The regression line meets the y-axis above zero
			-	The regression line meets the y-axis below zero
1	Age	Continuous variable	+	One-year increment in age of the household head increased the odds of the development outcome occurring by the factor of the Exp(B) coefficient of age; i.e. the odds of the development outcome occurring in a household headed by a younger person were lower than the odds of that headed by an older person. The study considered 34 years and below to be young.
			-	One-year increment in age of the household head decreased the odds of the development outcome occurring by the factor of the Exp(B) coefficient of age.
2	Income	Continuous variable (based on household expenditure (income)	+	Increment of the household income by one Kenya shilling increased the odds of the development outcome occurring by the factor of the Exp(B) coefficient of income.
			-	Increase of household income by one Kenya shilling decreased the odds of the development outcome occurring by the factor of the Exp(B) coefficient of income.
3	Gender	Dummy variable 1-female and 0 -male	+	Reference is female. The odds of females experiencing the development outcome were higher than the odds of males by the factor of the Exp(B) coefficient of gender.
			-	The odds of females experiencing the development outcome were less than the odds of males by the factor of the Exp(B) coefficient of gender.
4	Marital status	Dummy variable 1-single and 0-married	+	Single is the reference. The odds of single people experiencing the development outcome were higher than the odds of married people by the factor of the Exp(B) coefficient of marital status.
			-	The odds of single people experiencing the development outcome were lower than the odds of married people by the factor of the Exp(B) coefficient.
5	Education level	Continuous variable - number of years in school	+	One-year increment in education of the household head, increased the odds of the development outcome occurring by the factor of the Exp(B) coefficient of education. In this study, secondary education and above was regarded as high education. An equivalent of 12 years of education.
			-	One-year increment in education of the household head, decreased the odds of the development outcome occurring by the factor of the Exp(B) coefficient.
6	Skills	Dummy variable 1-skilled and 0- no skills (based on individuals' perception of their skills)	+	Reference is presence of skills. Presence of skills increases the odds of the development outcome occurring by the factor of the Exp(B) coefficient.
			-	Absence of skills decreased the odds of the development outcome occurring by the factor of the Exp(B) coefficient.

** Each variable assumes all other factors are maintained constant.*

Three broad hypotheses were formulated to guide the analysis in relation to the study framework as indicated in chapter 2. For each hypothesis (H_1), there was a null hypothesis (H_0) which was tested using the data collected.

1. H_1: Usage of new technologies is influenced by the six demographic factors.

   H_0: Usage of new technologies is not influenced by the six demographic factors.

2. H_1: Usage of new technologies is influenced by personal factors.

   H_0: Usage of new technologies is not influenced by personal factors.

3. H_1: Development outcomes of using new technologies are dictated by choice influenced by demographic factors and personal factors. (In addition to other factors out of scope of this study)

   H_0: Development outcomes of using new technologies are not dictated by choice influenced by demographic factors and personal factors.

3.6 Data Sources for Testing Hypotheses

As earlier stated, analysis and discussions in relation to RIA (2007) database is based on data from 1291 households that had an income of Kshs. 23,671 and below. For the survey (2010), sixty households were targeted. Of the sixty, a third of the households (20) had an income of more than Kshs. 23,671 and were disqualified from the analysis. The subsequent discussion is based on data from households with income of Kshs. 23,671 and below. However, the findings for both income groups are shown where the researcher found suitable, and in all the developed models although discussions are based on data from households with income below Kshs. 23,671.

The first hypothesis that examined whether the use of the new technologies was influenced by the six demographic factors was tested through regression analysis in table 10 with data derived from the RIA (2007) database.

The second hypothesis, which examined whether the usage of new technologies was influenced by personal factors (perceptions and preferences), was tested through non parametric Pearson's chi square tests (X^2) in tables 12 and 13 with data derived from the survey (2010).

The third hypothesis which examined whether development outcomes of using new technologies was dictated by choice influenced by demographic and personal factors in addition to other factors out of scope of this study was tested and presented in tables 17 to 27 using a combination of data from the RIA (2007) database and survey (2010) data.

While chapter four discusses Internet, email and mobile phones separately, chapters five and six consider email as a component of Internet hence discusses Internet and mobile phones only. In addition, tables 14, 15, 18, 21, 22, 23, 24, 25, 26, 27 and 29 uses only the mobile phone data to demonstrate the findings. This is because of the wide usage of the mobile phones in the low-income households and the fact that households were also using mobile phones to access the Internet and emails.

Part II

Research Findings and Discussions

The study findings are given and discussed in this part of the thesis. A narrative summary is used to report qualitative data, quoting responses verbatim where appropriate. In addition, there is use of triangulation, combining insights from qualitative and quantitative data. The new technologies are discussed together unless when one of the technologies is considered as the exclusive contributor. The term Internet includes email although in some cases Internet and email are used separately.

Chapter 4:

Factors Influencing Use of the New Technologies in Low-Income Households

4.1 Introduction

Electricity access level in the country stood at 47.5 per cent in the urban and 4.3 per cent in the rural areas (World Bank, 2007). About 13 per cent of the Kenyan population was connected to the national electricity grid. Despite the low connection, the mobile usage in low-income households across the country was high at 45.9 per cent, an indication that households devised ways of re-charging their mobile phones because they perceived them useful. Vision 2030 and its medium term infrastructure plan have identified quality, cost effective, affordable and reliable energy services as critical drivers towards achieving the economic and social pillars identified in the vision.

This chapter highlights the social-economic background of the respondents. It details the demographic and personal factors that influence the usage of the new technologies. The first hypothesis that examines whether the six demographic factors influence the use of the new technologies and the second hypothesis, which examines whether personal factors influence the use of the new technologies are tested and discussed.

4.2 Social-Economic Background of Sampled Population

To have an overview understanding of the two data sets used in the discussion, the frequency distribution of selected variables is given below. The mean age for the RIA (2007) database was 32.25 years with the youngest being 16 years while the oldest was 103 years. The mean number of years of education was 9.12 years while the mean expenditure interpreted as income was Kshs. 6,511. For those with income of Ksh. 23,672 and above, a significant difference is observed in the means and standard deviations of education, age and income compared to those below income level of Ksh. 23,671 (see Table 7).

Table 7: RIA (2007) Data Distribution

	Education Years	Age	Total Income	Household Size
Income of Kshs. 23,671 and below				
Mean	9.12	32.25	6,511	2.31
Median	8	29	5,000	2
Standard deviation	4.3	13.4	5,370	1.3
Minimum	0	16	0	1
Maximum	19	103	23,000	10
Income of Kshs. 23,672 and above				
Mean	13.6	29.7	67,847	3.12
Median	12.2	27	44,119	3
Standard deviation	3.6	11.5	79,277	1.7
Minimum	0	16	24,000	1
Maximum	23	70	500,000	14

Source: RIA (2007) Database

For the survey (2010), the mean age of the respondents was 36.8 with the oldest being 72 years and the youngest 18 years. The mean household expenditure was Kshs. 14,321 per month and mean expenditure on the new technologies was Kshs. 1,845 per month. The mean household size was three persons. A comparison of the standard deviations of those below income level of Kshs. 23,671 and those above shows a relatively small difference. The survey purposely focused on low-income clusters hence the highest income was still relatively small (see Table 8).

Table 8: Survey Data Distribution

	Education years	Age	Total expenditure (Kshs.)	E-communication expenditure (Kshs.)	Household size
Income of Kshs. 23,671 and below					
Mean	11.4	36.8	14,321	1,845	3
Median	12.0	33	14,683	1,450	3
Standard D.	3.46	13.24	3,814	1,318	1.7
Minimum	0	18	6,820	400	1
Maximum	16	72	20,860	5,000	5
Income of Kshs. 23,672 and above					
Mean	13.3	37.2	34,162	4,696	2.7
Median	13.3	31.5	30,160	4,250	2.5
Standard D.	2.5	14	10,514	2,938	1.2
Minimum	8	23	24,48	1,400	1
Maximum	18	72	66,825	12,700	7

Source: Survey (2010)

The survey (2010) is a subset of the RIA (2007) as stated earlier. As noted in tables 7 and 8, there is a difference in the mean incomes for the two datasets. This is explained by the fact that about 60 per cent of the households targeted in the RIA (2007) study were not in urban setup. Thirty per cent were in other urban outside of Nairobi and 30 per cent were in rural areas where expenditure in items such as food was minimal due to farm produces. This difference is noted too in the level of education where the mean education years in the RIA (2007) database were 9.12 while in the survey (2010), they were 11.4. This demonstrates inequity in opportunities to education between urban and rural low-income households.

Changes are also noted in the use of the mobile phones, Internet and Email in the two datasets. All the sampled households in the survey were using mobile phones and about a quarter of the households were using Internet and email (see Table 9).

Table 9: Households' Use of the New Technologies

	RIA (2007) database	Survey (2010)
Income of Kshs. 23,671 and below		
Mobile phones	1,365 (45.9%)	40 (100%)
Internet	297(10 %)	11 (27.5%)
Email	238 (8%)	10(25%)
Income of Kshs. 23,672 and above		
Mobile phones	455(85.8%)	20(100%)
Internet	336(63.4%)	10(50%)
Email	323(60.9%)	9(45%)

The respondents do not add up to 1291 for the RIA (2007) database because the data is weighted as earlier indicated. While email has long been the most widely used Internet application, the findings show that not all those who were using the Internet were using the email. This could be explained by the fact that other Internet applications such as the social networking applications including Facebook, Twitter, Chats and Blogs have become common too.

The taxes on mobile phone sets were removed in 2007, enabling most households to own a set. The findings demonstrate the impact of the policy change whereby in the RIA (2007) database, only 45.9 per cent of the respondents were using a mobile phone while the survey (2010) shows that 100 per cent of those interviewed were using a mobile phone. However, the study notes that other factors could have contributed to the increase in usage such as reduction in cost of handsets as well as availability of second hand mobile phones in the market. The survey (2010) further showed that the respondents were using the mobile phones to access the Internet and email.

As earlier noted, electricity access level in the country stood at 47.5 per cent in the urban and 4.3 per cent in the rural areas (World Bank, 2007), and only about 13 per cent of the Kenyan population was connected to the national electricity grid. Despite the low connection, the mobile usage in low-income households was high from the RIA (2007) data (45.9%), an indication that households devised ways of charging their mobile phones because they perceived them useful. The study noted that they used solar panels and old car batteries.

Installation of three undersea fiber optic cables by the end of 2009 facilitated lowering of the cost including those of international calls increasing the usage of the new technologies. For instance, access and use of Internet exceeded 8 million people by end of 2010 (CCK, 2010). Use of mobile phones to access the Internet contributed largely to the rise. The average call tariff declined from Kshs. 16.8 per minute in 2002 to three Kenya shillings per minute in 2010. The Internet access cost also declined from Kshs.15 per minute in 2000 to one Kenya shilling per minute in 2010.

4.3 Factors Influencing Usage of the New Technologies in LIH

Factors that influence the use of the new technologies in low-income households are discussed under two broad categories namely demographic factors, limited to age, income, gender, marital status, education level, and skills; and personal factors limited to perceptions and preferences in this study.

4.3.1 Demographic Factors

The study premised that usage of the new technologies by low-income households was influenced by age, income, gender, marital status, education level, and skills. A binary logistic regression analysis established that while the six factors influenced the usage in some way, the statistical significance was at different levels for each of the six factors (see Table 10). The table shows the regression coefficient (B), p-values (sig) and the odds ratio (Exp(B)) for each of the six factors for the respondents with income level of Kshs. 23,671 and below, and those with income level of Kshs. 23,672 and above for visual comparison purpose. However, all the discussions are based on data from the respondents with income level of Kshs. 23,671 and below.

Table 10: Regression Models of Internet, Email and Mobile Phone Usage

come vel		**Internet usage model:** *Hosmer & Lemeshow p-value =0.14; Nagelkerke R^2 = 0.57 below income of Kshs. 23,671 and p-value =0.36; Nagelkerke R^2 =0.56 above Kshs. 23,672 inclusive.*			**Email usage model:** *Hosmer & Lemeshow p-value =0.93; Nagelkerke R^2 = 0.58 below income of Kshs. 23,671 and p-value =0.67; Nagelkerke R^2 =0.53 below Kshs. 23,672 inclusive.*			**Mobile usage model:** *Hosmer & Lemeshow p-value =0.09; Nagelkerke R^2 = 0.81 below income of Kshs. 23,671 and p-value =1; Nagelkerke R^2 = 0.86 above Kshs. 23,672 inclusive.*		
		B	**Sig.**	**Exp(B)**	**B**	**Sig.**	**Exp(B)**	**B**	**Sig.**	**Exp(B)**
shs. 3,671 nd elow	Age of household head	0.01	0.70	1.006	0.001	0.96	1.001	0.01	0.12	1.015
	Income of household	0.00	0.72	1.001	0.000	0.86	1.001	0.00	0.003*	1.007
	Gender of household head	-0.57	0.79	0.931	-0.66	0.56	0.849	-0.82	0.38	0.802
	Marital status of household	0.48	0.10	1.613	0.49	0.12	1.634	-0.81	0.001*	0.420
	Education of household head	0.18	0.00*	1.201	0.24	0.00*	1.274	0.12	0.001*	1.122
	Skills of household head	4.57	0.00*	9.674	19.71	0.05*	8.620	7.13	0.000*	3.242.
	Constant	-7.67	0.00	0.000	-23.66	0.99	0.000	-3.40	0.000	0.033
shs. 3,672 nd bove	Age of household head	-0.001	0.97	0.999	0.006	0.83	1.006	0.10	0.13	1.104
	Income of household	0.00	0.29	1.005	0.00	0.29	1.006	0.00	0.56	1.003
	Gender of household head	-0.81	0.10	0.447	-0.80	0.09	0.451	0.71	0.56	2.028
	Marital status of household	0.58	0.35	1.791	0.44	0.47	1.548	-0.08	0.96	0.928
	Education of household head	0.14	0.04*	1.152	0.14	0.04*	1.151	0.38	0.15	1.457
	Skills of household head	4.83	0.00*	12.53	4.65	0.00*	10.458	22.37	0.99	5.171
	Constant	-5.57	0.002	0.004	-5.64	0.002	0.004	-9.35	0.05	0.000

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Variables in the Table

Hosmer & Lemeshow p-values assess the fit of the model by comparing the observed and expected frequencies. A non-significant p-value (>0.05) indicates that the data fit the model well. As noted, *Hosmer & Lemeshow* p-values are not significant for all the three models both above and below the income level of Kshs. 23,671 indicating that the data fitted the models.

Nagelkerke R^2 shows how well the model explains the variance. It is an estimate of R^2 that indicate the proportion of variability in the dependent variable (usage) that may be accounted for by all predictor variables (age, income, gender, marital status, education and skills) in the model. For instance the model for income at Kshs. 23,671 and below shows that the six demographic factors accounts for (57%) variance on Internet usage, (58%) on email usage and (81%) on mobile phone usage.

B refers to the standardised regression coefficient, which allows the effect of variables to be compared. The **B** coefficients represent the slope values in the regression equation indicating the amount the usage variable (dependent variable) will change by if the independent variables (six demographic factors) changes by one unit. A positive coefficient shows that the probability of usage increases as variable increases while a negative coefficient shows that probability of usage decreases as variable increases.

Sig refers to the p-value. The p-value is the measure of statistical significance of the variable. The stars (*) after the variables shows that the variable was statistically significant at 95 per cent confidence level.

Exp(B) refers to the exponential of regression coefficients. It is also called the odds ratio (OR), which estimates the change in the odds of usage (dependent) for a one unit increase in the independent variable. **Exp(B)** is interpreted in terms of the change in odds. A value greater than one (>1) means odds increase as variable increases while a value less than one (<1) means odds decrease as variable increases (Field, 2005).

Interpretation of the models from data with income of Kshs. 23,671 and below which is the focus of the study shows that the Internet usage model is fit explained by the values of *Hosmer & Lemeshow* p-values of 0.14 (>0.05), the *Nagelkerke* R^2 value of 0.57 shows that the six demographic factors explains 57 per cent of the usage variance. Likewise, the email model shows that model is fit explained by the value of *Hosmer & Lemeshow* p-values 0.93 (>0.05), the *Nagelkerke* R^2 value of 0.58 shows that the six demographic factors explains 58 per cent of the usage variance. The mobile model shows that model is fit explained by the value of *Hosmer & Lemeshow* p-values 0.93 (>0.05) the *Nagelkerke* R^2 value of 0.81 shows that the six demographic factors explains 81 per cent of the usage variance.

This finding demonstrates that in addition to the six demographic factors, there are other factors that influence usage, which accounts for the differences in the R^2 values (1- R^2). These factors include personal factors discussed in section 4.3.2 and other factors out of scope of this study, which includes person's psychology, mental condition, culture, social norms, occupation, and the wider environmental conditions.

The table further shows that for the income level of Kshs. 23,671 and below, education level had statistically significant influence on the usage of Internet, email and mobile phones as demonstrated through the p-values which are statistically significant ($p<0.05$). Skills had statistically significant influence on the usage of Internet and mobile phones but not email. Income and marital status had statistically significant influence on mobile phones usage, but not Internet and email usage. Age did not have statistically significant influence on Internet, email and mobile phones usage. Worth noting is that education and skills had statistically significant influence on the usage of Internet and email for those with income of Kshs. 23,672 and above. This shows that regardless of income level, education and skills have significant influence on the usage of the Internet and email but not the mobile phones.

To further show the relationship between the usage of the three technologies with the six demographic factors, the regression coefficients, **B** and the **Exp(B)** (odds ratio) are

discussed under each of the six demographic factors starting with age, income, gender, marital status, education level and skills. The discussion focuses on data from households whose income is Kshs. 23, 671 and below.

Age

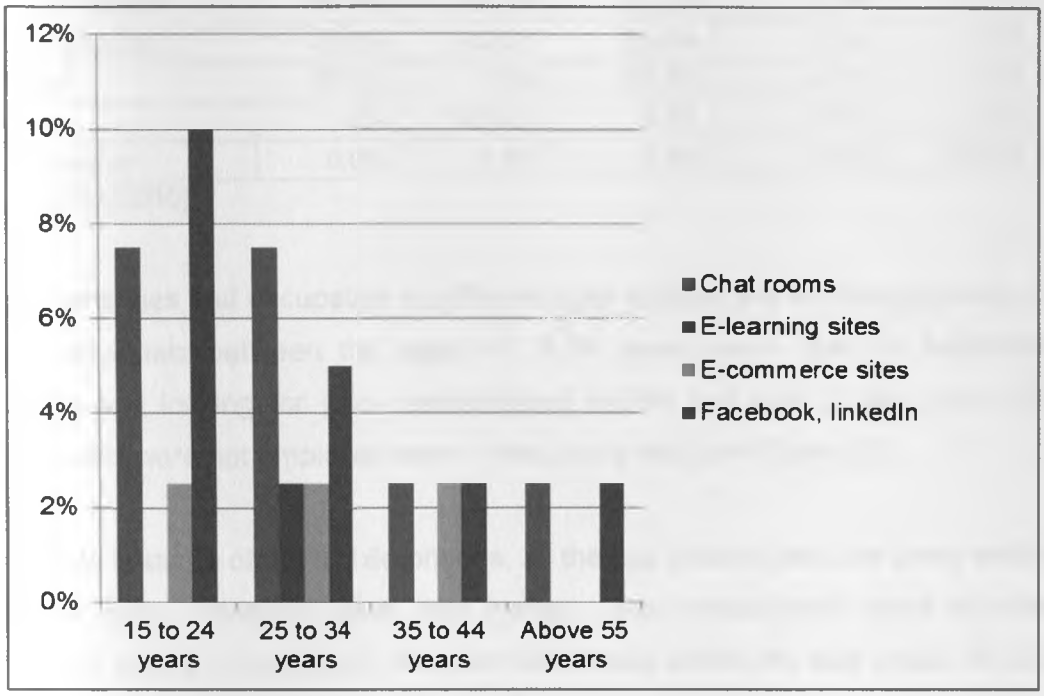
The study took those below 34 years as young (youth) as earlier indicated. Age had no statistically significant influence on the usage of Internet, email and mobile phones as shown in table 10. While the study notes that there are varied uses of the new technologies, the question asked if the respondents used the technologies, and not how or for what they were using the technologies. That explains why age did not have a statistically significant influence on the usage as would be expected since people of different age used different aspects of the technologies. Internet, email and mobile phones have multiple uses for people of all ages.

As demonstrated by the values of **Exp(B),** one year increment in age increased the odds of using the Internet with a factor of 1.006, usage of email with a factor of 1.001 and usage of mobile phones with a factor of 1.015. Internet, email and the mobile phones had positive regression coefficient B on age. Overall, the coefficients were very small for Internet (0.01), email (0.001), and mobile phones (0.01) indicating that the influence age had on usage of the three technologies was minimal. However, age influenced the features of the technologies used as demonstrated in figure 7. Hargittai (2002) found age to be inversely related to the ability to find information online.

Alampay (2006) and Olatokun (2009) established that young people were easy adopters of new technologies. The survey (2010) established that 80 per cent, and 81.4 per cent of the respondents who were using Internet and email respectively as at the beginning of 2010 were using mobile phones to connect and were within the age bracket of 18-34 years. Internet features such as social networking sites (Facebook, Myspace, Twitter, Classmates) professional networking sites such as (LinkedIn,

Probook) and the e-learning sites and courses offered online gave every age group a reason to use the Internet (see Figure 7).

Figure 7: Internet Features Used in Relation to Age



Source: Survey (2010)

Those in the age group of 25 to 34 years were using most of the features of the Internet. Of interest is e-learning which was only used by this age group. This could be explained by the fact that all the students were in this age group in addition to 33.3 per cent of those in formal employment being between 25 and 34 years. Those in formal employment comprised those working in training institutions, which comparatively exposed them to e-learning opportunities (see Table 11).

Table 11: Occupation in Relation to Age

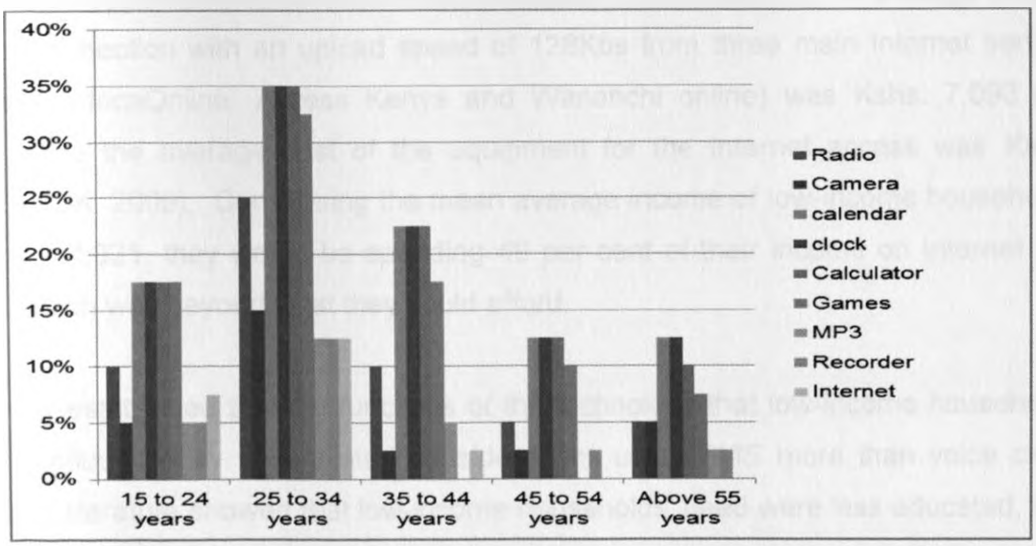
	15 to 24 years	25 to 34 years	35 to 44 years	45 to 54 years	Above 55 years
Students	0.0%	100.0%	0.0%	0.0%	0.0%
Informal business	0.0%	33.3%	20.0%	26.7%	20.0%
Formal employment	16.7%	33.3%	33.3%	8.3%	8.3%
Informal employment	40.0%	40.0%	20.0%	0.0%	0.0%
Unemployed	75.0%	0.0%	25.0%	0.0%	0.0%
Housewife	0.0%	100.0%	0.0%	0.0%	0.0%
Retired/pensioner	0.0%	0.0%	0.0%	0.0%	100.0%

Source: Survey (2010)

Individuals' priorities and occupation at different ages dictated the technology used. For instance, individuals between the ages of 18-24 years were keen in establishing relationships and looking for jobs demonstrated by the fact that 75 per cent of the respondent who were not employed were in this age group (see Table 11).

With regard to features of the mobile phones, all the age groups used the basic features such as the radio, calendar, clock, and games. Few respondents used advanced features such as the Internet and recorder with those within the age group of 25-34 years using most of the features (see Figure 8)

Figure 8: Mobile Features Used in Relation to Age



Source: Survey (2010)

From the findings, age had a very marginal influence on the actual usage of the three technologies as demonstrated by the odds values ***Exp(B)*** coefficients which are very small and the marginal positive ***B*** coefficients (See table 10). However, as discussed, age influenced the features used.

Income

As noted in table 10, income did not have a statistically significant influence on usage of Internet and email, but it had on mobile phones. The ***B*** coefficients on income for the three valuables are zero. However, the ***Exp(B)*** coefficients shows that an increase of income by one Kenya shilling (1. Ksh) led to the odds of using the Internet to increase by 1.001, odds of emails use to increase by 1.001 and the odds of the mobile phone use to increase by 1.007. While the changes are marginal, the results confirm Chabossou (2009) findings, which showed that higher income results in higher probability of having a mobile phone and subsequent use.

The study notes that income did not have statistically significant influence in all the three technologies too for the respondents with income of Kshs. 23,672 and above. The less influence of income on Internet and email usage could be because; majority of those who used the technologies constituted 66.6 per cent of those in formal employments who had the opportunity to access the technologies in their offices. The average cost of Internet connection with an upload speed of 128Kbs from three main Internet service providers (AfricaOnline, Access Kenya and Wananchi online) was Kshs. 7,093 per month while the average cost of the equipment for the Internet access was Kshs. 11,400 (CCK, 2009). Considering the mean average income of low-income households as Kshs. 14,321, they would be spending 49 per cent of their income on Internet per month, which was beyond what they could afford.

The study established that the functions of the technology that low-income households use are influenced by cost related considerations using SMS more than voice calls. Reviewed literature showed that low-income households' head were less educated, had less income, and were likely to spend less on e-communication although if viewed in

terms of disposable income spent on e-communication, they spent more (London, 2007). Chabossou (2009) analyzed factors that contributed to the probability of an individual adopting technology. He noted that income and education enhanced mobile phone adoption and that people would increasingly adopt mobile phones should their income increase. He argued that mobile expenditure was inelastic with respect to income, an indication that the share of mobile expenditure of individual income increased less than one per cent (1%) for each one per cent increase in income. People with higher income spent a smaller proportion of their income on mobile expenditure compared to those with less income (*ibid.*).

On average, individuals spent 16.7 per cent of their income on mobile phone related expenses. Some households had an income of less than Kshs.10,000 and spent a significant amount of it (close to 8%) on e-communication. Of the respondents who earned a monthly income of less than Kshs. 10,000, 62.7 per cent had eight and less years of education, an indication that increased number of years of education led to an increased level of income. In a number of cases, the type of handsets that the respondents owned was related to levels of income with those who had a higher level of income tending to have phones with greater functionalities.

A study by Tiwari (2008) found that people with higher levels of income and literacy used ICT services more than those with lower income and literacy. From the above discussion, a conclusion is drawn that the level of income influenced the usage of the three technologies although the influence was not statistically significant for the Internet and email usage. Increased income led to a marginal change in the odds of using the Internet and emails. This is an indication that increased income did not automatically translate to more usage of Internet and email but led to increased usage of the mobile phones. This shows that there are other factors that influenced the usage of the Internet and email other than the income. However, as earlier noted, some of the respondents accessed the technologies from their work places.

Gender

Table 10 shows that gender did not have statistically significant influence on usage of Internet, email and mobile phones. The regression coefficients ***B*** were negative, with Internet (-0.57), email (-0.66) and mobile phones (-0.82) an indication that the probability of females using the technologies were lower than the males considering females were the reference group (see Table 6). This is further affirmed by the **Exp(B)** coefficients that show that the odds of females using the Internet were 0.931 less than for males, the odds of females using email were 0.849 less than for males and the odds of females using the mobile phones were 0.802 less than for males. The gender difference in usage could be a reflection of other inequalities in the households. The findings from the qualitative data showed that female respondents and in particular those who were married experienced challenges on usage, reflecting gender imbalance in usage of the new technologies. A 28-year-old female pharmacist respondent indicated that one had to make a choice between use of the new technologies and family integration since some calls could be chaotic and brought disharmony in the families as discussed in detail in chapter 6.

In all the three technologies, a higher per cent of the males was using the technology compared to the per cent of the females. This is despite a larger number of female respondents. Worth noting is that for the respondents with income of Kshs. 23,672 and above, a higher per cent of the female respondents were using the mobile phones compared to the male respondents. This could be an indication that female respondents in the low-income households had exceptional challenges in relation to mobile phone usage (see Table 12).

Table 12: Cross Tabulation of Usage and Gender

	Mobile phones users			Internet users			Email users		
Income of Kshs. 23,671 and below									
	Used	Not used	Total	Used	Not used	Total	Used	Not used	Total
Male	564 (48.7%)	594 (51.3%)	1158	154 (13.3%)	1004 (86.7%)	1158	129 (11.1%)	1029 (94%)	1158
Female	801 (44.1%)	1016 (57.4%)	1817	143 (7.9%)	1674 (92.1%)	1817	109 (6%)	1708 (94.4%)	1817
Total	1365 (45.9%)	1610	2,975	297 (10 %)	2678	2,975	238 (8%)	2,737	2,975
Income of Kshs. 23,672 and above									
Male	187 (77.6%)	54 (22.4%)	241	168 (69.7%)	73 (30.3%)	241	162 (67.2%)	79 (32.8%)	241
Female	268 (72%)	21 (28%)	289	168 (58.1%)	121 (41.9%)	289	161 (55.7%)	128 (44%)	289
Total	455 (85.8%)	75	530	336(63.4%)	194	530	323 (60.9)	207	530

Source: RIA (2007) Database

Chabossou (2009) found that gender did not increase or decrease the probability of mobile phone adoption. However, Venkatesh and Morris (2000) argue that men and women adopt technologies differently and may view the same mode of communication differently. Schmidt & Stork (2008) showed that being a woman reduced the probability of high e-skills in nine out of 17 countries they studied. Adeya (2002) found that generally, females had less access to ICT than males.

Gurumurthy (2006) indicated that there have been gains for females in usage of ICT in many sectors such e-commerce, e-governance, health and information sharing via the Internet. However, she argues that the gains do not always result in equitable gender relations. Alampay (2006) confirmed this. The KIHBS study showed that prevalence and intensity of poverty among female headed households was higher than those headed by male (KNBS, 2007). This diverse findings shows that gender per se may not influence the usage, but other factors around gender such as inequalities in education or income levels as demonstrated in table 12.

A cross tabulation of the respondents gender and education level reveals that more males had acquired many years of formal education compared to females from both

data sets. However, the difference across gender for those with an income of Kshs.23,672 and above was relatively small compared to those in the lower income category (see Table 13).

Table 13: Cross Tabulation of Education Level and Gender

Level of education in years	RIA (2007) database		Survey (2010)	
	Male[5]	Female	Male	Female
Income of Kshs. 23,671 and below				
0	11.4% (131)	13.3% (241)	0	9.1% (2)
1 to 8	41.8% (479)	46.5% (845)	11.1% (2)	13.6% (3)
9 to 12	36.9% (423)	30.2% (549)	38.9% (7)	54.5% (12)
13 to 14	0.7% (8)	1.2% (27)	33.3% (6)	18.2% (4)
15 to 16	8.8% (101)	8.5% (155)	16.7% (3)	4.5% (1)
17 to 19	0.30%	0.00%	0.00%	0.00%
Total	38.7%(1,145)	61.3%(1,817)	40% (18)	60% (22)
Income of Kshs. 23,672 and above				
0	2.9% (7)	0.7% (7)	0	14.3% (2)
1 to 8	18.3% (44)	11.8% (34)	16.7%(1)	21.4% (3)
9 to 12	32.9% (79)	45.3% (131)	16.7%(1)	21.4% (3)
13 to 14	5.4% (13)	6.2% (18)	33.3%(2)	14.3% (2)
15 to 16	34.6% (83)	32.2% (93)	33.3%(2)	21.4% (3)
17 to 19	5.8% (14)	3.8% (11)	0	1(7.1%)
Total	45.4% (240)	54.6% (289)	6(30%)	14 (70%)

Huyer and Hafkin (2007) observed that a range of socio-economic and political factors affect and frame the gender divide. They included social and cultural barriers to technology use, education and skills levels, employment and income trends, privacy and security and available mode of access dictated by the location. Schmidt & Stork (2009) found that being female negatively affected the probability of someone having e-skills. These results support the findings that men and women differ in their usage of the new technologies since skills are a prerequisite to usage. Skills are mainly obtained through formal education although they are increasingly being acquired through other means as well.

Zainudeen et al. (2008) conducted studies on mobile phone usage at the bottom of the pyramid in Asia and concluded that, while there was gender divide in access to ICT in

[5] 8 males had their years of education missing

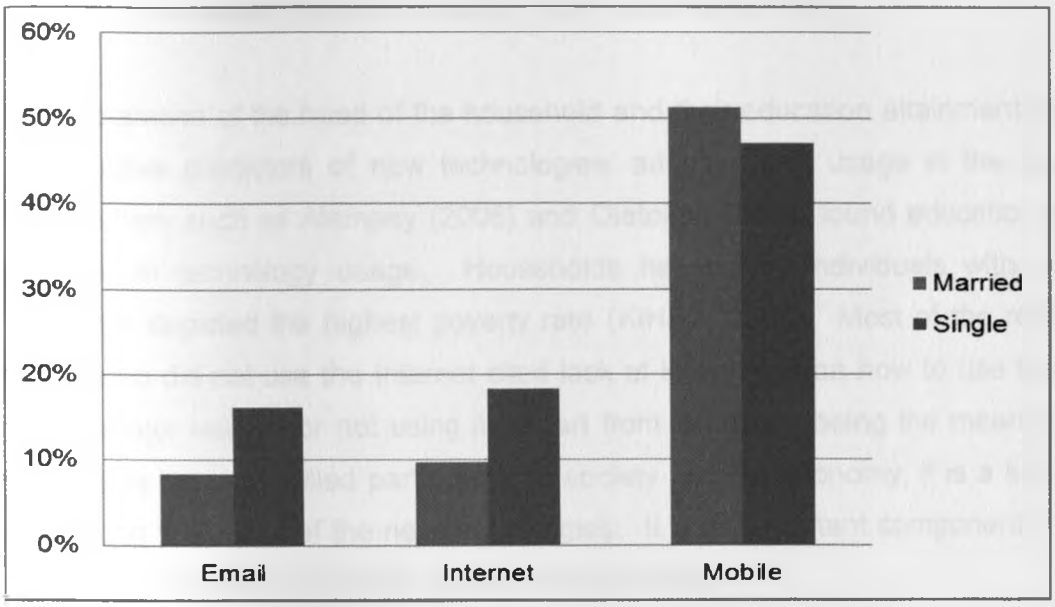
Pakistan and India, there was less of a divide in Sri Lanka, and none in the Philippines and Thailand, where women were empowered and mobile phones were pervasive.

From the findings, a conclusion can be drawn that gender differences in usage is due to other inequalities in the social economic domains one being education as demonstrated in table 13.

Marital status

Table 10 shows that marital status had statistically significant influence on mobile phone usage but not Internet and email usage. The regression coefficients ***B*** for marital status on usage were Internet (0.48), email (0.49) and mobile usage (-0.81) an indication that single people were using the email and the Internet more than the married people, but the married people were using the mobile phones more given that single people was the reference group (see Table 6). This is further affirmed by the **Exp(B)** values which shows that the odds of single people using the Internet and email were more than for married people by 1.614 and 1.634 respectively. However, the odds of single people using the mobile phones were less than for married people by 0.42. This finding could be a reflection of gender differences in usage considering that 58.1 per cent of the respondents were married and comprised 35.5 per cent married males and 64.5 per cent married females. This shows that gender differences are likely to be seen through the lens of marital status (see Figure 9).

Figure 9: Marital Status in Relation to Technology Usage



Source: RIA (2007) database

This finding can be explained further by the fact that the single people created more time to access the Internet and email considering that as noted earlier, social networking was a major use of the new technologies. Married people whose large percentage was female used the mobile phone more than the single. This could be because purchasing a SIM card and borrowing a mobile phone from friends and neighbors in low-income households whenever one needed to communicate was common practice.

Education Level

Table 10 shows that the education level had statistically significant influence on the usage of Internet, email and mobile phones in the low-income households. Worth noting is that the influence was also statistically significant on the usage of Internet and email for the respondents with income of Kshs. 23,672 and above. The ***B*** regression coefficients on education level are Internet (0.18), email (0.24) and mobile phone (0.12). The ***Exp(B)*** coefficients shows that one year increment in the level of education

increased the odds of using the Internet by 1.201, increased the odds of using email by 1.274 and increased the odds of using mobile phones by 1.122.

The occupation of the head of the household and their education attainment are strong and positive predictors of new technologies' adoption and usage in the household. Researchers such as Alampay (2006) and Olatokun (2009) found education to play a key role in technology usage. Households headed by individuals with no formal education depicted the highest poverty rate (KIHBS, 2005). Most of the respondents (70%) who did not use the Internet cited lack of knowledge on how to use the Internet as the major reason for not using it. Apart from education being the means by which individuals become skilled participants in society and the economy, it is a key driver in expanding the usage of the new technologies. It is an important component in creating knowledge societies, economic growth, and prosperity.

Of those who were in formal employment where they had access to the new technologies, 83.3 per cent had secondary education and above (over 12 years of education). The education level determined the features of the technology used. The respondents interviewed who had a university degree were using Internet and email. Those with only secondary education mainly used networking sites such as Chat rooms and Facebook while those with university education used more productive features of the Internet such as e learning and e-commerce sites. The researcher notes that the proportion of the respondents who had university/tertiary education was significantly small in relation to that with secondary education with 67.5% of the respondents having secondary education while only 7.5% of the population had university/tertiary education. 25% of the respondents had below secondary education. Interpretation of the finding should consider these facts (see Figure 10).

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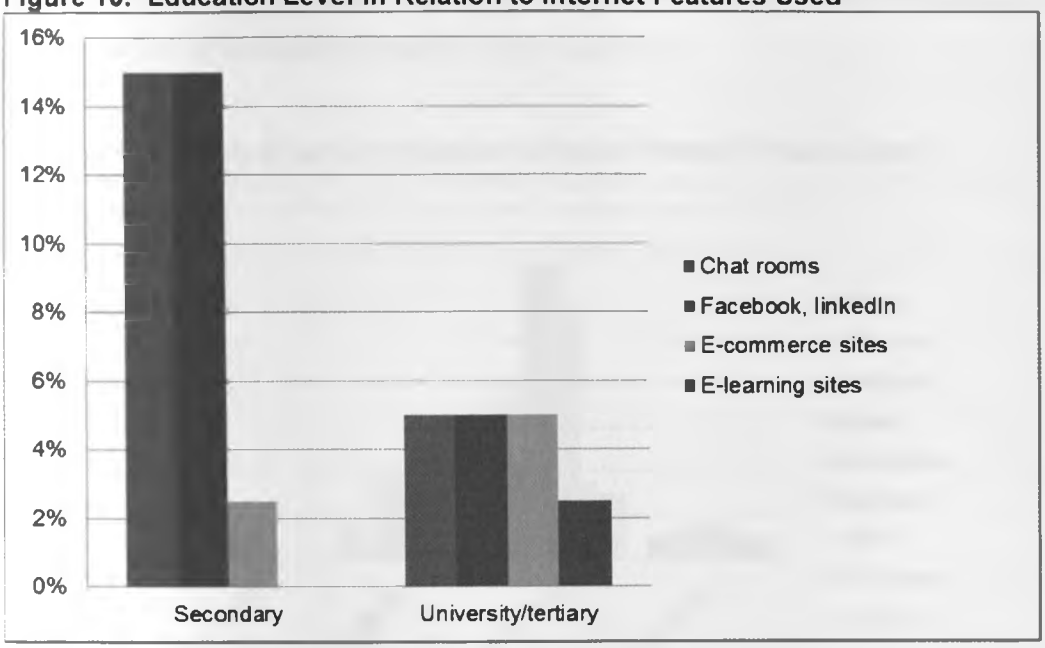
Figure 10: Education Level in Relation to Internet Features Used



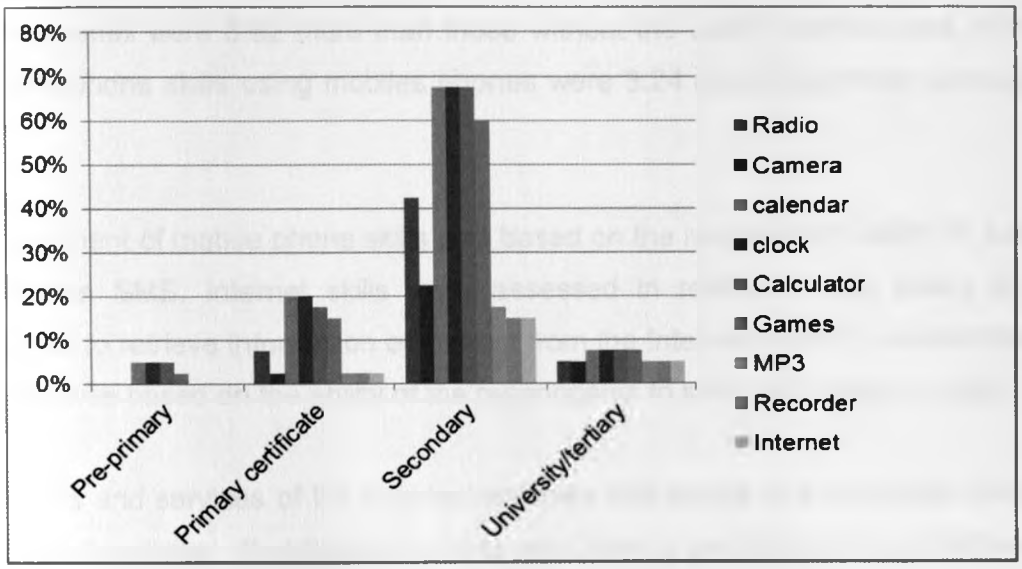
Source: Survey (2010)

The greater potential of the new technologies towards reducing poverty lies in the use of the Internet. It has a greater scope for access to information and communication in many multi-media formats. As noted, from the findings, there is a strong link between use of Internet and education level, with secondary education being the critical threshold. None of the respondents who did not have secondary education were using the Internet. As the new technologies get more sophisticated, education levels will affect their full use and utilisation of their potential benefits including accessing and uploading of local content and using advanced Internet features.

As Kenny (2002) notes, low income people use of more advanced Internet operations such as e-commerce faces barriers because they do not have the requisite credit facilities and logistical services that could deliver the types of goods they would want to buy or sell. However, this challenge is being addressed through the partnership between banks, mobile operators and post office services such as the Western Union across the globe.

Most of those with secondary education and above used most of the features of mobile phone just as in the case of Internet (see Figure 11).

Figure 11: Education Level in Relation to Mobile Phone Features Used



Source: Survey (2010)

The finding demonstrates that the education level influenced usage of the new technologies in addition to determining the extent the technology was used for social, economic and knowledge purposes.

The study however notes that the respondents in the survey (2010) were using M-PESA regardless of their education level. Even functional illiterates could pay for services using mobile money, an indication that an innovation like M-PESA can change these arguments about the role of education in the usage of the new technologies.

Skills

Skills had statistically significant influence on Internet, email and mobile phone usage (see Table 10). Just like in the case of education, the influence was statistically significant on the usage of Internet and email for the respondents with income of Kshs. 23,672 and above. The regression coefficients ***B*** on skills are Internet (4.57), email

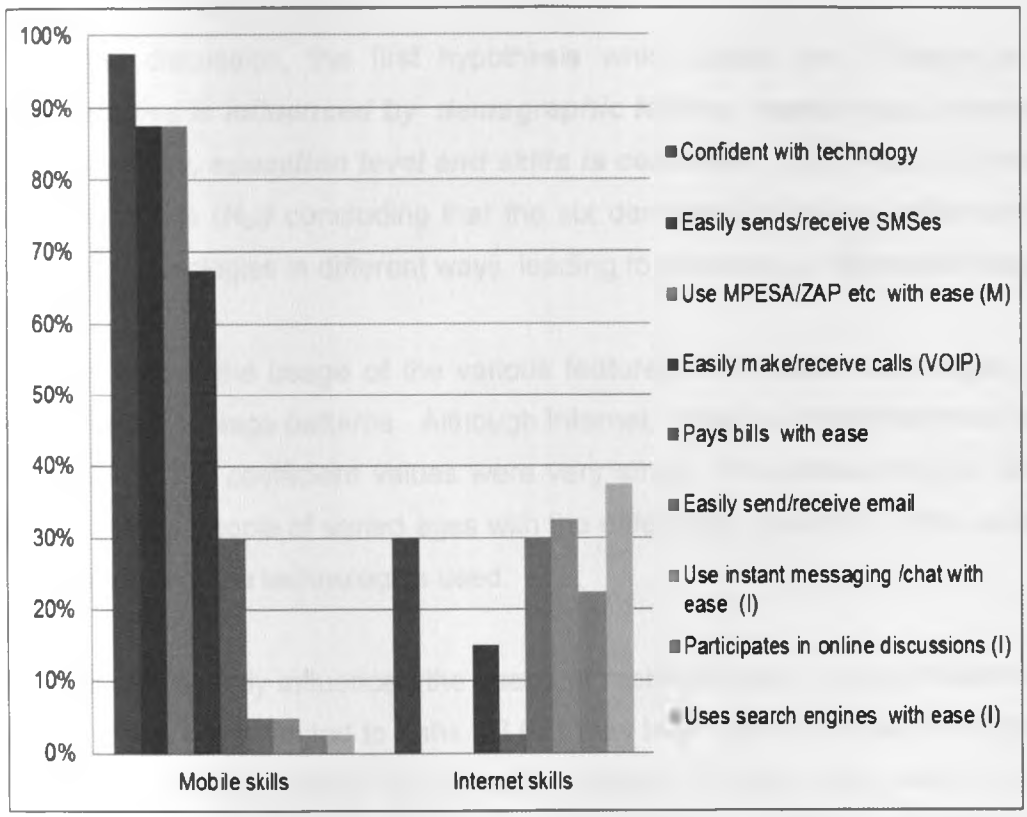
(19.71) and mobile phones (7.13). The high coefficient values show that skills had a huge influence on the use of the new technologies. This is further affirmed by the ***Exp(B)*** coefficients which shows that the odds of those with Internet skills using the Internet were 9.67 more than those without the skills. The odds of those with email skills using email were 8.62 more than those without the skills, and the odds of those with mobile phone skills using mobiles phones were 3.24 more than those without the skills.

The assessment of mobile phone skills was based on the respondent's ability to access and send an SMS. Internet skills were assessed in relation to the ability of the respondents to retrieve information of interest from the Internet while the assessment of email skills was based on the ability of the respondents to send and receive emails.

The features and services of the new technologies that people use are mainly dictated by the skills they have. E-skills permit those who have to participate more effectively in the global information economy and society, access opportunities to conduct business and transact more efficiently. For the respondents who were not using the Internet, they cited lack of skills as a main reason for not using. Those without skills were hindered from even making the initiative of using the new technologies. Schmidt and Stork, (2008) assessed the relationship between e-skills and education level using an ordered logistic regression model (Ologit) in 17 African countries using the RIA (2007) data. They established that in 16 out of 17 countries the strongest positive and significant effect on probability of higher e-skills could be attributed to having completed tertiary education. Having completed secondary education provided less predictive power and was a significant factor for 15 countries.

A question was asked to determine the skills in specific aspects of the Internet and mobile phone usage. The respondents had varied skills in using the various features of the two technologies (see Figure 12).

Figure 12: Mobile Phone and Internet Usage Skills



Source: Survey (2010)

The figure demonstrates that more respondents had skills in using most features of the mobile phones compared to the Internet. All the respondents could easily send and receive an SMS. Even though a new innovation, M-PESA usage skills were high; an indication that households acquired skills on the various technologies based on the benefits to be derived as earlier observed. Online payment of bills was not highly rated despite its helpfulness. This could be attributed to the fact that the possible bills to be paid were water and electricity, which were included in rent for most of the respondents in these low-income households. Skills influenced the usage of the advanced features of the new technologies.

Conclusion

From the discussion, the first hypothesis which stated that ***"Usage of the new technologies is influenced by demographic factors, namely age, income, gender, marital status, education level and skills is confirmed.*** This leads to rejection of the null hypothesis (***H_0:)*** concluding that the six demographic factors influenced usage of the new technologies in different ways leading to increased or decreased usage.

Age influenced the usage of the various features of the new technologies. It further influenced the usage patterns. Although Internet, email and mobile phones had positive coefficients, the coefficient values were very small. This shows that the technologies were used by people of varied ages with the differences occurring in the usage patterns and features of the technologies used.

Income significantly influenced the usage of mobile phones, but not Internet and email. The fact that it was limited to Kshs. 23,671 may have made its influence less statistically significant for the Internet and email. However, income was also not statistically significant for the respondents with an income of Kshs. 23,672 and above an indication that there were other factors other than the income, which influenced the usage significantly. Further, only a small percentage of the households were using Internet and email as demonstrated in table 9. However, an increase in income led to the odds of using the three technologies to increase marginally. The study notes that some respondents invested on the handset only, and specialized on beeps and please call me messages hence their income was not affected by the usage.

Gender influenced the usage of the new technologies. While gender did not have statistically significant influence on the three technologies, the odds shows that females were less likely to use the technologies than the males. This could be linked to education where, males were more educated than the females (see Table 13). While by 2010 all the households had a mobile phone, females expressed more challenges in usage particularly those who were married.

Marital status significantly influenced the usage of the mobile phones. The low-income households were disadvantaged in terms of education, income and employment status and this was carried to marriage. Some female respondents found that the new technologies, especially the mobile phone, brought conflict with their spouses. Married female respondents expressed a feeling of being controlled and monitored through the new technologies by their spouses.

Education significantly influenced the usage of all the three technologies. The study found a link between education level and presence of skills. Education increased the chances of having the relevant skill of using the new technologies. Presence of skills positively influenced the usage of the three technologies. Further, skills were statistically significant in the usage of the three technologies. The study noted that M-PESA was widely used regardless of the education level of the users.

Overall, the order of the six demographic factors in relation to the magnitude of influence on the usage of Internet in low-income households as demonstrated by the ***B*** coefficients in table 10 was skills (4.57), gender (-0.57), marital status (0.48), education (0.18), age (0.01) and income (0.0). The order of the six demographic factors in relation to the magnitude of influence on the usage of email in low-income households was skills (19.71), gender (-0.66), marital status (0.49), education (0.24), age (0.001) and income (0.0). Finally, the order of the six demographic factors in relation to the magnitude of influence on the usage of mobile phones in low income households was skills (7.13), gender (-0.82), marital status (-0.81), education (0.12), age (0.014) and income (0.0). As earlier indicated, 64.5 per cent of the respondents who were married were females and this could explain the close link between the variables of gender and marital status.

4.3.2 Personal Factors

The study had further premised that perceptions and preferences referred to as personal factors in this study influence the usage of the new technologies. This section

discusses the role of perceptions and preferences in relation to usage of the new technologies.

The study used non-parametric test, Pearson's chi-square (X^2), to establish how the perceptions of the respondents affected mobile phone usage in relation to the demographic factors. The use of demographic factors was because preferences and perceptions exist in an individual who had entrenched attributes as at the time of data collection namely age, income, gender, marital status, education level and skills. All the respondents in the survey (2010) indicated that they had mobile phone skills (i.e. could send and receive SMS) hence, the variable is not shown in tables 14 and 15.

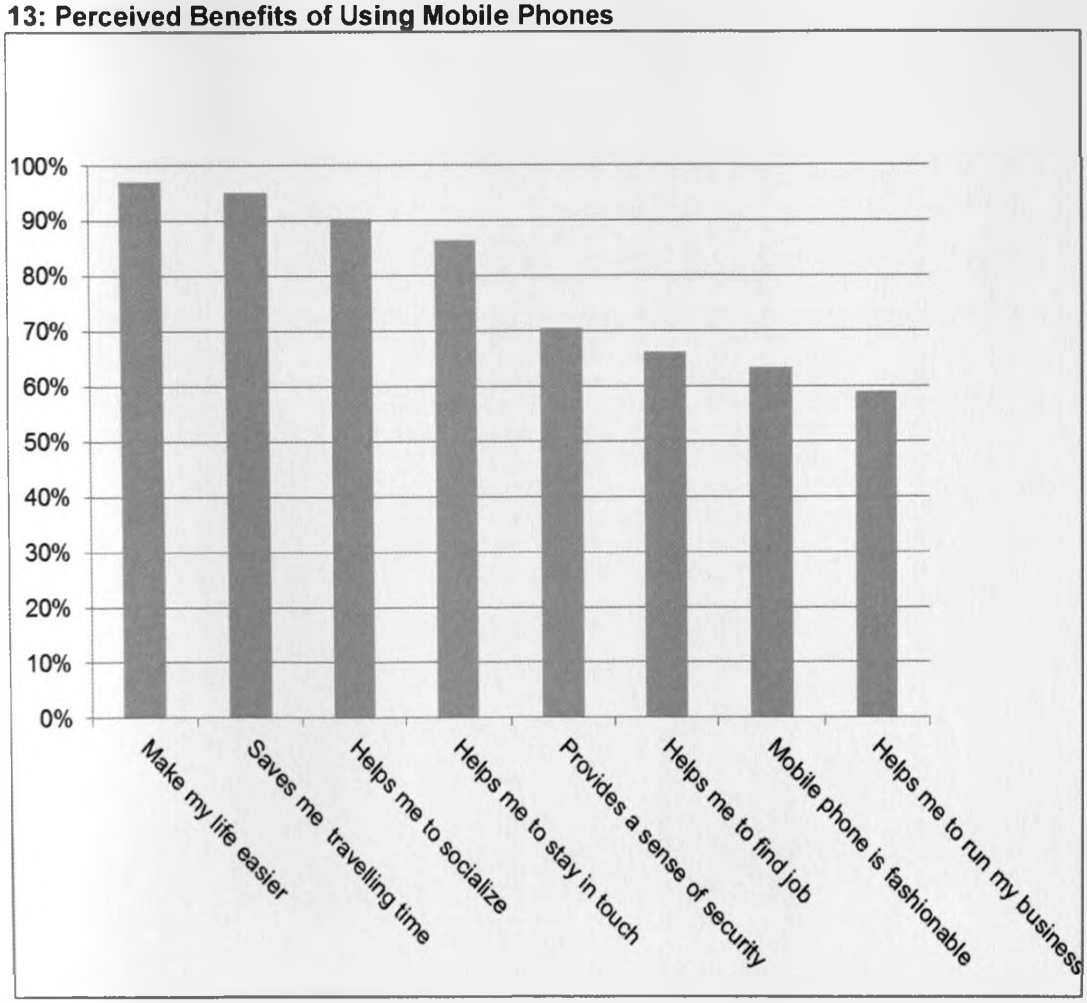
The tests are meant to show that in addition to the demographic factors influencing the usage, individual's perceptions and preferences (personal factors) also had an influence making people in the same age group, income bracket, gender, marital status and education level to arrive at different decisions in relation to the usage of the technologies. The study argues that identical people in all the six attributes of demographic factors may perceive the same thing in different ways while completely different people may perceive the same thing in a similar way. These perceptions influence their preferences and the decisions they make in relation to use of the new technologies. If a service or a good is not perceived to be useful or helpful by the individual, usage is not given priority.

Perceptions

The respondents used the technologies they considered inexpensive. They perceived SMS to be cheaper because the cost of exchanging messages was shared between the two parties, while mobile phone call costs had to be paid exclusively by the caller, regardless of how much the receiver contributed to the conversation. SMS allowed for an economical communication with either party spending as they extend the communication.

The households perceived the new technologies differently in relation to their helpfulness in carrying out their daily activities (see Figure 13). 97.3 per cent of the respondents indicated that mobile phones made their lives easier and 95.1 per cent found them helpful in terms of time and cost savings. Of the respondent, 65.6 per cent found mobile phones helpful in getting jobs while 60.1 per cent found them helpful in running their business. The study established that to get some jobs, applicants were expected to have a mobile phone for communication with their potential employers. Respondents further indicated that some employers used text messages to contact their employees and for information dissemination. 70.8 per cent of the respondents' perceived mobile phones to provide security in cases of emergency (see Figure 13).

Figure 13: Perceived Benefits of Using Mobile Phones



Source: RIA (2007) Database

Perceptions were evaluated using Pearson's chi-square (X^2) defined as the sum of the squared differences between the observed frequency (O) and the expected frequency (E) divided by the expected frequency (E) ($X^2 = \sum (O-E)^2/E$). Seven hypotheses based on perceptions of mobile phone usage in the social, economic and knowledge dimensions of development were evaluated. Their null hypotheses (H_0) were tested (see Table 14).

Table 14: Chi-Squares for Perceptions

		Age		Income		
		Calculated X^2	Table X^2	Calculated X^2	Table X^2	Calc ated X^2
Economic	H_0- Mobile phones gives business a competitive edge **does not** affect usage	1.6	5.99	1.04	9.488	1.37
	H_0- Mobile phones have led to job creation **does not** affect usage	0.05	5.99	6.75	9.488	9.84
	H_0- Household finding mobile phones to be expensive **does not** affect usage	3.63	5.99	6.166	9.488	0.93
Social	H_0- Households finding mobile phones to bring conflicts **does not** affect usage	2.83	5.99	2.61	9.488	6.12
	H_0- Household finding mobile phones to help in alleviation of poverty **does not** affect usage	4.55	5.99	6.29	9.488	3.1
Knowledge	H_0- Household finding mobile phones to improve productivity **does not** affect usage	2.17	5.99	2.68	9.488	2.62
	H_0- Household finding mobile phones to be convenient to use **does not** affect usage	1.51	3.841	0.844	5.99	0.99

Source: (Survey, 2010)

* Confidence level=95%.
* Table reading is = 3.841 when degree of freedom is 1; 5.99 when degree of freedom
*Decision rule is to reject null hypothesis when calculated X^2 is greater that tabulated

Interpretation of the Table

From table 14, the null hypothesis is rejected in two cases (denoted by *) where the calculated X^2 is greater than the tabulated X^2 confirming that perceptions influence usage in relation to some aspects of demographic factors.

Case 1 - The perception that mobile phones have led to job creation affected usage in relation to gender but not in relation to age, income, marital status and education level. This means that perceptions of respondents of the same gender were different when it came to the issue of mobile phones creating jobs hence affecting usage.

Case 2 - Like in the case of job creation, the perception that mobile phones brought conflicts in households affected usage in relation to gender but not in relation to age, income, marital status and education level. This means that respondents of the same gender had different perceptions on whether mobile phones brought conflicts in the households.

From the findings, the second hypothesis is confirmed based on the households' perceptions in relation to the demographic factors. A conclusion is drawn that perceptions influence the usage of the new technologies. People of the same gender perceived the new technologies differently as demonstrated in the two cases.

Preferences

Individuals further base decisions made on usage of the new technologies on valued preferences. For instance, while basic and low-priced mobile phones led to similar levels of capabilities as complex and expensive ones, they were perceived to have lower levels of utility for the person with a preference for expensive tastes. Satisfaction of these tastes required different resources in the form of finances and skills to understand the technologies.

A question that sought to find out respondents' preferences in relation to using features of Internet and mobile phones established the following. While the amount of money an individual had on their mobile phone dictated whether to make a call or send an SMS in the case of mobile phone and send an email, or chat for the Internet, individual preferences played a role too. Respondents preferred SMS when privacy was a concern, and where complete silence was required. In addition, SMS was preferred in conditions where mobile phone calls were impossible to use such as in noisy places or where a slight noise was undesirable such as in a church.

Respondents preferred to make and receive calls on their mobile phones at daytime. However, they did not switch them off at night. For the Internet, time of the day or night was not given much regard since by its nature, messages are left and the recipient retrieves them on demand. The typing skills mattered in relation to chatting via Internet as opposed to sending an email. For the mobile phones, the respondents preferred to call or even 'beep' and only sent messages if the recipient was unavailable or it was late into the night.

To establish how usage of the mobile phones was affected by the preferences (calling or sending an SMS), Pearson's chi-square (X^2) was used. Six hypotheses, two in each dimension of development showing the selected preferences in relation to the demographic factors were formulated. Their null hypotheses were tested. The preferences were in relation to usage of the mobile phone features of either making a call or sending an SMS (see Table 15).

Table 15: Chi-Squares for Preferences (Call or Send SMS)

		Age		Income		Gende
		Calculated X^2	Table X^2	Calculated X^2	Table X^2	Calculated X^2
Economic	H_0- Available money **does not** influence usage.	6.98*	3.841*	3.5	5.991	0.631
	H_0- Urgency of the message **does not** influence usage.	2.68	3.841	6.74*	5.991*	0.6
Social	H_0- Relationship **does not** influence usage.	0.76	3.841	1.99	5.991	0.29
	H_0- Time of day or night **does not** influence usage.	3.95*	3.841*	2.77	5.991	5.45*
Knowledge	H_0- Sensitivity of the message **does not** influence usage.	1.58	3.841	0.59	5.991	0.65
	H_0- Capability of the recipient **does not** influence usage.	0.79	3.841	0.192	5.991	0.004

Source: (Survey, 2010)

* Confidence level =95%.
* Table reading is = 3.841 when degree of freedom is 1; and 5.99 when degree of fre
*Decision rule is to reject null hypothesis when calculated X^2 is greater than tabulate

Interpretation of the Table

From table 15, the null hypotheses are rejected in four cases (denoted by *) where the calculated X^2 is greater than the tabulated X^2 confirming that preferences influence usage. The four cases are discussed below.

Case 1 - Available money influenced usage in relation to age but not in relation to income, gender, marital status and education level. This means that preferences of people in the same age group were different when it came to a decision of either making a call or sending an SMS when available money was to be considered or was limited.

Case 2 - Urgency of the message influenced usage in relation to income but not in relation to age, gender marital status and education level. This means that preferences of people in the same income group were different when it came to a decision of either making a call or sending an SMS when the message to be communicated was urgent.

Case 3 & 4 -Time of day or night influenced usage in relation to age and gender but not in relation to income, marital status and education level. This means that preferences of people in the same age group were different when it came to a decision of either making a call or sending an SMS late into the night. Likewise preferences of people in the same gender were different in relation to calling or sending an SMS late into the night.

Conclusion

Through the computations summarized in tables 14 and 15, the second hypothesis which stated that ***"Usage of new technologies is influenced by personal factors (preferences and perceptions) is confirmed"*** This leads to rejection of the null hypothesis (***H_0:***) concluding that personal factors influence the usage of the new technologies.

Perceptions and preferences are embedded in people who have a combination of demographic factors. The reason for using the demographic factors was to show that while they influenced the usage as earlier demonstrated (see Section 4.3.1), personal factors influenced the usage too. People of the same age, gender, and income bracket had different preferences in relation to sending SMS or making a call while people of the same gender had different perceptions as to whether mobile phones led to job creation and brought conflicts in households. This shows that perceptions and preferences influence usage independent of the demographic factors confirmed by the varied figures of calculated X^2 for the demographic factors based on the perceptions and the preference of the respondents.

The chapter has demonstrated that the demographic and personal factors influence the usage of the Internet, email and the mobile phones. For the demographic factors, binary logistic regression demonstrated the outcomes. *Hosmer & Lemeshow p-value* confirmed the models goodness of fit and *Nagelkerke* R^2 showed the percent of variance explained by the models. Regression coefficients (*B*), odds ratio (*Exp(B)*) and the p-values (sig) for the variables were shown too. For the personal factors, Pearson's chi-square (X^2) calculated the observed frequency and compared with the expected frequency and based on that, a decision on whether there existed a relationship between preferences and perceptions (personal factors) and usage of the mobile phones as an example in relation to the demographic factors of the respondents was established. This led to rejection of some of the null hypothesis.

Chapter 5:

Enabled Capabilities and Role of Choice in Conversion Process

5.1 Introduction

Sen (1999) argues that a person's capability identifies that person's effective freedom to achieve valuable states of beings and doings. Capabilities in this study refer to the opportunities enabled by the use of the new technologies in the social, economic and knowledge dimensions of development, referred to as the enabled capabilities of the new technologies. This includes freedom to achieve valuable *Functionings*, but also to forgo them. Sen argues that two people with identical capability set are likely to end up with different types and levels of development outcomes (*Functionings)*, as they make different choices following their different ideas of good life (*ibid.*).

This chapter explains the process used to derive the enabled capabilities. The chapter examines the capabilities enabled through the use of the new technologies and the role of choice in mediating the conversion process of capabilities to the development outcomes.

5.2 Derivation of Enabled Capabilities

The capabilities were derived from the RIA (2007) database and informed by the reviewed literature. A question that sought to find out what the respondents had used the Internet and mobile phones for in the three months preceding the survey was analyzed. The question was semi open-ended with options given where multiple responses were allowed and a provision for additional uses that were not included in the multiple choices. The responses showed that the respondents used the new technologies differently presenting wide opportunities in the three dimensions.

Access and usage of the technologies have been cited as a factor for social- economic development (Samuel et al., 2005). De Silva and Zainudeen (2007) argue that there is ample evidence that mobile phones used in the right way and for the right purpose, can have a significant outcome in addressing specific social and economic developmental goals as well as play a key role in national development.

The uses of mobile phone were analyzed separately from the uses of Internet with the focus narrowed to the uses of the technologies in the social, economic and knowledge dimensions of development. The findings show that the new technologies were broadly used to access information including job opportunities, communicate generally and particularly in case of emergency, e-commerce, e-learning, as a boost to self-esteem and earn respect from peers, time management (clock and calendars) and for entertainment. The study noted that in the three dimensions, the capabilities enabled by the mobile phones were closely linked to those enabled by the Internet.

With the opportunities presented by the new technologies, demonstrated through the uses listed above, and informed by literature reviewed, the study derived eight capabilities, classified into three categories that were enabled by the usage of the new technologies (see Table 2). Social capabilities were communication and information access, social status, security, and privacy and intrusion. Economic capabilities were income change, jobs and employment. Knowledge capabilities were skills and individual productivity, and knowledge accumulation and dissemination.

The eight enabled capabilities were subjected to public scrutiny through the survey (2010) targeting three clusters resided by the low-income households. This re-confirmed that the eight were valued by these particular low-income households, making the enabled capabilities to be context specific. The researcher observed that progressively, low-income households were using mobile phones with advanced features that enabled transmission of data and video clips in addition to voice. Internet and email use through the conventional means of using computers was limited. Trends from mobile phone operators complemented these findings and showed that mobile

phones were becoming the main medium for Internet and email access across the country. This diminished the line between their roles as a means of communication with that of a medium for information access.

5.3 Enabled Capabilities through the Use of New Technologies in LIH

This section discusses the eight capabilities enabled through the use of the new technologies in the social, economic and knowledge dimensions of development.

5.3.1 Social Capabilities

The study established four social capabilities derived by the use of the new technologies namely communication and information access, social status, security, and privacy and intrusion.

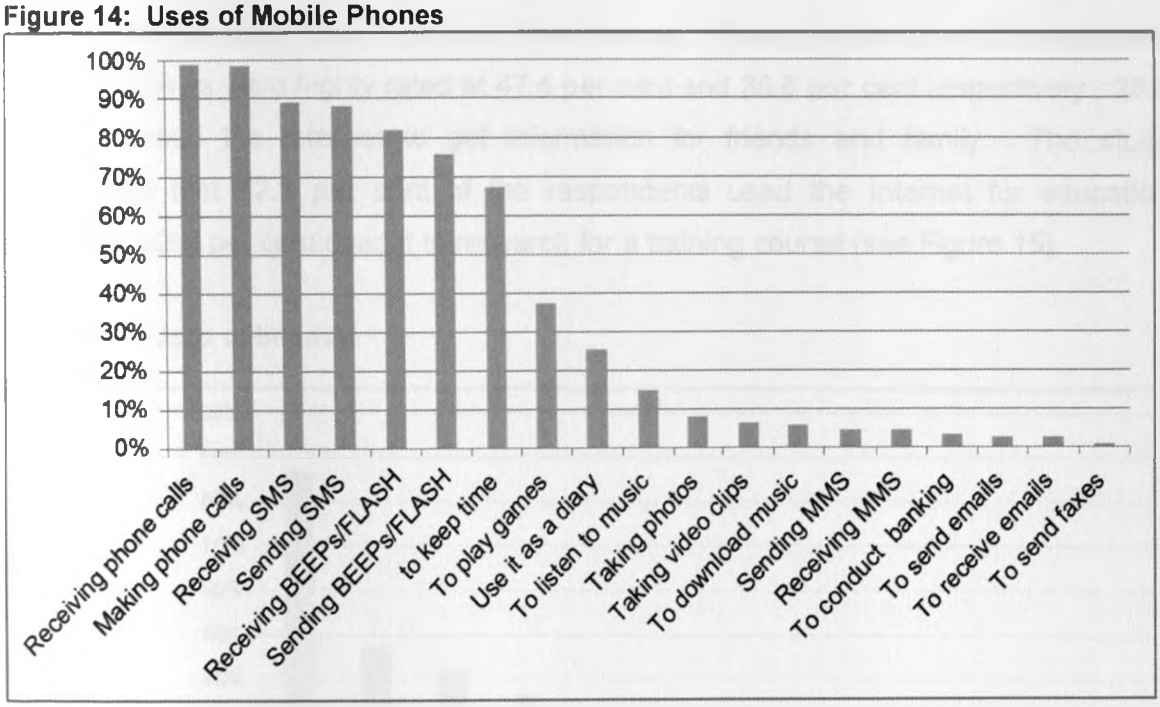
Communication and Information Access

The new technologies enabled households to communicate with family members and friends with speed and ease. In addition, they enabled them to access information ranging from health, agriculture and education. The new technologies were used for business and social dealings with associates, friends and relatives. They provided households with the option to travel or not, yet enabling them to stay in touch with family and friends leading to less travel expenses. The respondents used the Internet for information access and as entry to Chat rooms, Facebook and other networking sites. Mobile Internet allowed wireless access to the digitized content on the Internet including e-mail messages, access to general information, instant messaging services, and voice-over-internet-protocol (VOIP) services.

Mobile phones were mainly used for making and receiving calls with a rating of 98.6 per cent and 99.2 per cent respectively as well as for sending and receiving SMS rated at 89.4 per cent and 90.1 per cent respectively. Over 70 per cent (73.3%) were using the

mobile phones for beeping and flashing while 81.7 per cent frequently received beeps and flashes on their mobile phones (see Figure 14).

Figure 14: Uses of Mobile Phones



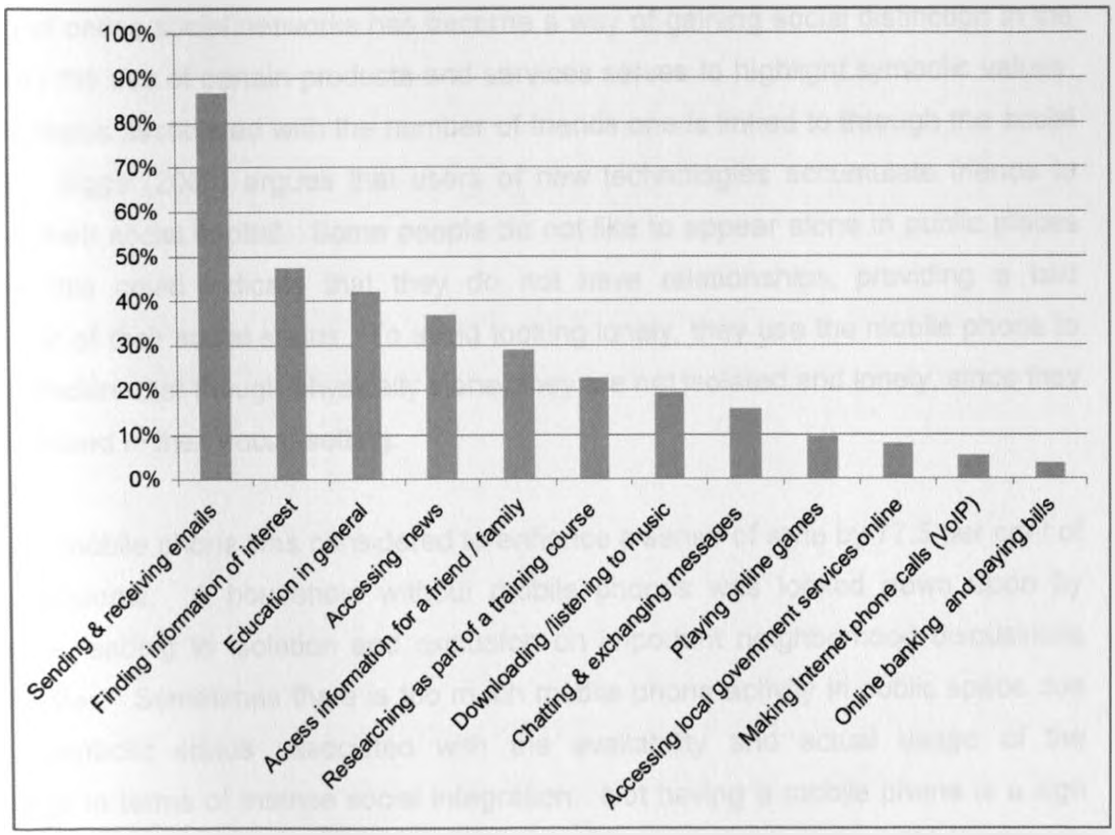
Source: RIA (2007) Database

Distance between people no longer determined the mode of communication since people in the same building block used chats and SMS to communicate just as they did with people in different towns and sometimes countries, with a minimal difference in cost margins that only applied across countries. This included access to social networking and instant messaging forums.

The concept of 'please call me' and flashing ensured that even those without constant flow of cash maintained a mobile phone once they purchased a set and were able to push communication costs to those they communicated with. Due to traffic congestion as a result of "beeps" and "flashes", operators such as Safaricom devised a way to minimize the congestions by giving an allowance of five free calls through sending SMS with a "please call me" message.

Sending and receiving emails was noted to be the main use of Internet from 89.2 per cent of the respondents who used the Internet. Email was perceived as a tool for communicating with those out of the country. Those who did not have friends or relatives abroad used other features of the Internet. Finding information of interest and accessing news were highly rated at 47.4 per cent and 36.8 per cent respectively. 28.9 per cent used the Internet to get information for friends and family. The study established that 42.1 per cent of the respondents used the Internet for education purposes, 22.8 per cent used it to research for a training course (see Figure 15).

Figure 15: Uses of Internet



Source: RIA (2007) Database

From the findings, a conclusion is drawn that the technologies complemented each other in their various strengths under different circumstances. The study revealed that mobile phones were mainly used to communicate with friends and family members

while emails were used for business and official transactions. This relate to the fact that 54.5 per cent and 60 per cent of those who used Internet and email respectively were in formal employment. The finding confirms Zainudeen, Samarajiva and Abeysuriya (2006) findings in a study conducted among financially constrained users in several localities in India and Sri Lanka. They found that mobile phones were mainly used for keeping in touch with family and friends rather than for business and financial transactions.

Social Status: Social Inclusion and Exclusion

The use of online social networks has become a way of gaining social distinction in the same way the use of certain products and services serves to highlight symbolic values. There is status associated with the number of friends one is linked to through the social network. Bigge (2006) argues that users of new technologies accumulate friends to increase their social capital. Some people do not like to appear alone in public places because this could indicate that they do not have relationships, providing a bad impression of their social status. To avoid looking lonely, they use the mobile phone to publicly declare that though physically alone, they are not isolated and lonely, since they are embedded in their social setting.

Owning a mobile phone was considered to enhance a sense of style by 77.5 per cent of the respondents. A household without mobile phones was looked down upon by neighbors, leading to isolation and exclusion on important neighborhood discussions and activities. Sometimes there is too much mobile phone activity in public space due to the symbolic status associated with the availability and actual usage of the technology in terms of intense social integration. Not having a mobile phone is a sign that people do not depend on the person for urgent direction, hence the person is considered to be out of touch with the real world. People express disappointment when they have no messages in their email box or mobile phones as this means no one wanted to get in touch with them. Receiving a call is considered a sign that one has not fallen into complete oblivion, in spite of what is communicated.

The mobile phones enabled the respondents to, receive calls anywhere and anytime. While this enhanced their social status, it presupposed high tolerance on the side of callers who had to be disposed to discuss private matters in public while the rights of bystanders were violated when forced to listen to private conversations.

In a research in five Asian countries, Silva and Zainudeen (2008) established that the poor found access to mobile phones to improve their social relations and status. However, as argued by Fortunati (2005) mobile phones may support tendencies towards closure rather than tendencies to open up to new acquaintances. They are often used to strengthen already existing relationships, not necessarily to enlarge social interaction to wider circles. A respondent said,

> When I get calls from friends and relatives, I feel loved and connected. For my business, when I do not have maize, I call people from Kitale who have been supplying to me. I buy via phone and they organise for transport. I pay them through M-PESA. This enhances social status.[1]

The new technologies facilitated various forms of entertainment taking over from radios and televisions (see Figures 14 and 15). People use the Internet to socialize with people they do not know and expand their circle of friends (Jones, 2009). Dwyer (2007) reported that the usefulness of social networking sites as a means of establishing contact with old friends is not met regularly. Of the respondents, 15 per cent used their mobile phones to take photographs while 10.7 per cent to take video clips. 21.2 per cent of the respondents used the mobile phones and Internet to download music while 28.6 per cent used the technology to listen to music online and play online games. The photographs taken were shared with friends and business associates through uploading them in social networking sites such as Facebook and video clips uploaded in Youtube.

Security

The new technologies are helpful in emergency responses and averting security mishaps. Souter et al., (2005) found security to be an important benefit from mobile

phone use. They make it easier to maintain and develop contact with family members living and working elsewhere, and to get financial and other help in times of crisis. Of the respondents, 85 per cent and 10 per cent indicated that the mobile phones and Internet respectively enhanced their security status. Rice & Katz, (2003) noted that safety was the primary motive for women to acquire a mobile phone. The mobile phones increased their feeling of security due to the enhanced ability to act in an emergency. De Silva and Zainudeen (2008) have reiterated the ability to act in an emergency as being a significant benefit of direct access to mobile phones. Benefits can also be seen in disaster management, through all stages from warning through response to recovery (Samarajiva et al. 2005).

The study established that mobile Phones helped in emergency responses and averting security mishaps. Households used mobile phones to alert others of potential dangers and to mobilize response teams. The respondents had exchanged their mobile numbers and kept updating each other on security issues. Incidentally, the mobile phones were blamed for the spread of kidnapping occurrences across Kenya where abductors used the victims phone to demand for a ransom (Kamau, 2009). However, mobile phone operators were using the same technologies to track down the suspects hence the technologies had the capabilities of being used to perpetuate crimes and at the same time used in crime control. In addition to physical security, the respondents indicated that mobile phones expanded their financial and emotional security particularly through the use of M-PESA. A respondent said, "I receive money from my siblings abroad because we communicate often. Then I send the money via M-PESA to my parents".[2]

This demonstrates that by having a mobile phone that is enabled for money transfer, the respondent felt more secure because even if they did not have cash with them, they knew they could get it instantly if there was a need.

Privacy and Intrusion

Gross and Acquisti (2005) found that despite awareness and concern for Internet privacy, users rarely altered their privacy settings. Young people expressed less worry about their privacy online compared to older people. This is because they understood how to control the security features and were able to choose what to share. On some networking sites such as MySpace and Facebook, users must disclose personal information to create an account including name, birth date, email, gender and country. Facebook requires that users disclose the name of the school, college, or group with which they are affiliated to. Provision for displaying personal photographs is also given. MySpace is equipped with a formatting template and standardized choices that users employ to display information. All this information can easily be availed to the public.

The respondents indicated that use of Internet and mobile phones led to invasion and infringement of individuals' and households' right to privacy. They indicated that they felt controlled and monitored through the new technologies as will be discussed in section 6.3.3. However, it also gave them privacy and freedom from intrusion since they could give false information regarding their whereabouts and choose which calls to answer.

5.3.2 Economic Capabilities

The integration of the new technologies into virtually all aspects of the economy and society has created a digitally enabled economy with the technologies redefining and expanding sources of income, means of employment and methods of service delivery. Respondents indicated that they conducted sales and marketing using the new technologies. While economic development is very broad and the new technologies have promoted and sometimes hindered economic development in many aspects, the study focused on two enabled capabilities in the economic dimensions namely household's income change; and jobs and employment.

Income Change

Use of the new technologies affected households' income in different ways. Mobile phones enable a greater spread of locations for micro enterprise activities (Overå, 2006). The respondents indicated that use of the new technologies introduced new ways of earning and spending an income. They expanded the options of marketing and sales of products and services in addition to providing wider market for purchases.

Households working in the informal sectors as well as small-scale farmers were able to post their products and services via the Internet. Entrepreneurs using mobile phones reported that trading increased in speed and reduced in cost (Donner, 2004). The technologies eliminated the need for the intermediaries and related expenses through the value chain. By using mobile phones, households were able to compare prices and sell in places where the returns were high. The technologies further allowed the households to work 24/7 hours and to be in constant touch with their clients and suppliers leading to income increment.

The study noted savings such as using a mobile phone for listening to news, which was free apart from marginal cost related to re-charging the mobile phone compared to the cost of radio batteries. Other savings through Internet and mobile phone enhanced activities such as money transfer services, e-commerce, e-learning and online research were noted.

Jobs and Employment Access

The new technologies enabled job creation directly and indirectly (CCK, 2008). The technologies allow more people to join the workforce, including those only able to work from home or remotely by providing tele-working options (Cisco, 2008). They promote the growth of the business process outsourcing sector (BPO), where they have enabled households to access jobs in foreign markets. One out of four of the respondents used the mobile phone to access job opportunities.

There were household members employed through mobile phone repairs, mobile phone re-charging especially in areas with no electricity, those whose mobile phones were used on commercial basis by community members to buzz, flash or send please call me texts. Internet training and guidance in the cyber cafés were some of the jobs that the Internet assisted in creating, mainly to the youth. Having a job and earning money enabled *Functionings* such as self-worth and raised one's dignity. Casual and domestic workers with no access to mobile phones were likely to lose job opportunities compared to those with access. In addition, small-scale food vendors were likely to get more revenue if they remained accessible to their clients all through.

5.3.3 Knowledge Capabilities

The knowledge potential associated with the new technologies has facilitated unforeseen progress in innovation. As Prahalad (2004) puts it, innovation across the board is imperative to serve the bottom of the pyramid. He notes that serving the low-income households is not about cheap and low quality products, but about bringing together the best of technology and resources to address local opportunities. The new technologies integrate knowledge for focused action and reaction. Internet and the mobile phones enable information and knowledge access. Knowledge provides the individuals and households a competitive edge across the globe. The study looked at two enabled capabilities in the knowledge dimension namely skills and individual productivity; and knowledge accumulation and dissemination.

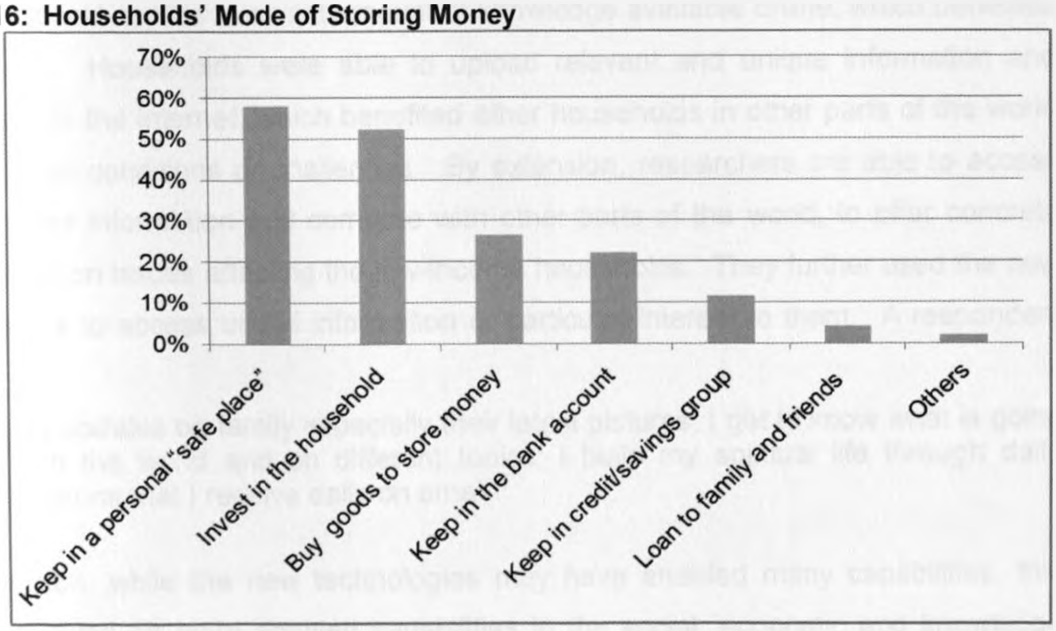
Skills and Individual Productivity

The new technologies facilitated expansions of skills and expertise leading to time and cost saving. This led to improved individual productivity. Donner (2007) notes that flexibility associated with having mobile phones impacted on productivity and households' income. The new technologies facilitate expansion of skills and expertise leading to time and cost saving. They improve individuals' productivity through speeding up the transmission and reception of information. They have led to innovative

services and modes of working. Skills that were not traditionally needed or known emerged due to the new technologies such as remote working, money transfer and online research skills. This led to improved individual productivity enhanced by speedy transmission and reception of information that households considered crucial in accessing markets and getting in touch with people. Internet and mobile phones enabled and facilitated skills acquisition through e- learning. Universities in Kenya have started offering distance-learning courses facilitated by Internet through various connection options including mobile broadband.

Mobile phone as a means of receiving and sending payment, which saved on time leading to improved productivity was considered by 28 per cent of the respondents to be widely acceptable. Of the respondents, 50.9 per cent of those with mobile phones had transferred airtime for various reasons and 55.6 per cent indicated that they used mobile phones for money transfer because of the low transaction costs, while 63.2 per cent considered it safe with instant feedback and no loss of money even if the mobile phone was stolen (see Figure 16).

Figure 16: Households' Mode of Storing Money



Source: RIA (2007) Database

Only a small proportion (33.6%) of the respondents kept money in a formalized way (bank account and credit and savings group). Of the respondents, 58 per cent kept money in a personal safe while 52.4 per cent invested the money in the household. 26.6 per cent bought goods regardless of the usefulness of the items bought while 4.1 per cent loaned the money to families and friends. Within three years, this scenario had changed and 91.6 per cent of the respondents in the survey (2010) used mobile phones for storing money as well as for money transfer. This has led to time saving resulting to improved productivity.

Households used mobile phones as a time management tool as well as a diary replacing the need for watches and calendars in some cases. 67.1 per cent of the respondents used mobile phones to keep time while 29.7 per cent used it as a diary (see Figure 14). Some households were using their mobile phones as flashlights, using the backlight on the mobile phone whenever power supply was disrupted abruptly.

Knowledge Accumulation and Dissemination

Internet allowed access to a vast amount of knowledge available online, which benefited households. Households were able to upload relevant and unique information and knowledge to the Internet, which benefited other households in other parts of the world facing similar conditions or challenges. By extension, researchers are able to access the uploaded information and compare with other parts of the world, to offer concrete suggestions on issues affecting the low-income households. They further used the new technologies to access useful information of particular interest to them. A respondent said,

> I get updates on family especially their latest pictures; I get to know what is going on in the world and on different topics; I build my spiritual life through daily devotions that I receive daily on email.[3]

In conclusion, while the new technologies may have enabled many capabilities, this study narrowed on eight enabled capabilities in the social, economic and knowledge dimensions of development as discussed. The eight enabled capabilities are

communication and information access; social status; security; privacy and intrusion; income change; jobs and employment access; skills and individual productivity; and knowledge accumulation and dissemination.

5.4 Role of Choice: Conversion of Capabilities to Development Outcomes

The study argues that the conversion of the enabled capabilities to development outcomes is a matter of choice, influenced by the demographic and personal factors in addition to other factors that were out of scope of this study. As noted in section 5.3, the new technologies created and enhanced capabilities in low-income households in the social, economic and knowledge dimensions of development. This represented opportunities offered by the new technologies to the low-income households. However, to fully exploit the opportunities in the social, economic and knowledge dimensions of development, and derive development outcomes, choices have to be made on whether to use the technologies and how to use them. These choices determine the ultimate development outcomes derived from the usage. Development outcomes, which are progressively becoming evident, include increased financial spending, conflicts in households, and time wastage arising from irresponsible and excessive use of the new technologies.

While the study focused on six demographic factors and two personal factors, and how they influenced the usage of the new technologies as demonstrated in chapter 4, the study argues that their role extended to influence the ultimate choice made to derive development outcomes. Other factors such as person's psychology, mental condition, culture, social norms, occupation and the wider environmental conditions played a role too, a combination of which determined the development outcomes derived from the usage of the new technologies. The influence of the other factors is evident from the qualitative information received from the respondents as quoted from some of the interviews. A respondent said,

> I am in my fourth year of self-employment. I do farming in Machakos and supply building and cleaning materials to the government. I have been busy and Internet did not fit in my work. However, I am starting to develop interest since I have seen its usefulness.[4]

Another respondent said,

> I do not have interest with Internet. However, a friend keeps on rushing to check on information from the Internet even for 30 minutes and she seems to be benefiting from it so I will consider using.[5]

This demonstrates that choice is an outcome of a decision making process and if a service or product is perceived to be important, then a favorable decision is made towards the product leading to its utilization. Further, friends and peer groups could influence choice leading to usage. The literature reviewed established that two people with identical capability set were likely to end up with different types and levels of development outcomes, as they made different choices following their different ideas of good life (Sen, 1999). A respondent said,

> It is sometimes shameful to remove a cheap phone in front of people, however people are violently robbed their mobile phones; so as long as I can use it to communicate, I look for a cheap phone.[6]

This demonstrates that the environment dictated usage and the development outcomes derived. Because of insecurity linked to expensive mobile phones, the respondent chose an inexpensive mobile phone, which despite the fact that it facilitated communication; he was left feeling ashamed in the presence of his peers.

As will be discussed in chapter 6, while some households used the new technologies to improve their productivity and to get in touch with their friends, others used the new technologies to harm others or create anxiety when unreachable. The outcome from the usage was a product of choices made on the usage. People choose to switch off the mobile phone for various reasons sending different signals to people attempting to reach them. A respondent said,

> Mobile phones cause disturbances. When I do not want to be disturbed by unknown people and avoid problems with my husband, I switch off the mobile phone. I switch the mobile phone off too when I do not want to communicate with anyone.[7]

For some, use of the new technologies led to increased business performance while to some it led to a decreased business performance. This was based on the choices they made since in essence the new technologies offers equal capabilities and opportunities for all. Some households used the new technologies to increase their income or access job opportunities; while others lost job opportunities because of using the new technologies. Some became victims of criminal activities through the new technologies while others used the new technologies to commit crimes and infringe on others privacy. A respondent said,

> There are many idlers who just flash you to say hello and you end up wasting money and time. I have become insecure in my relationship so I keep checking my boyfriends' phone without his knowledge to see who he has been communicating with.[8]

Some respondents did not use the new technologies because they preferred face-to-face communication despite having capabilities to use the new technologies. Use of goods and services derives benefits because their characteristics enable people 'to do' and 'to be', and they generate capabilities (Robeyns, 2005). The respondents demonstrated that there are varied factors that influence choice. This was based on what they valued and their circumstances. To avoid calls from strangers, a respondent chose to switch off the mobile phone. The other respondent chose to be ashamed rather than be robbed an expensive phone violently. Some respondents opted not to use the new technologies and in particular, the mobile phones to avoid disharmony caused by their spouses going through their mobile phones' call log.

As Schmidt and Stork, (2008) notes, understanding what factors enable some people to optimise opportunities presented by the new technologies is complex. The findings demonstrate that in addition to the demographic and personal factors, there are other factors that influence choice, determining the usage of the new technologies and the

ultimate development outcomes derived. They include person's psychology, mental condition, culture, social norms, and the wider environmental conditions among others.

The chapter has demonstrated that the new technologies enabled capabilities in low-income households and narrowed down to eight enabled capabilities. The chapter has further shown that choice dictates the ultimate outcomes from the enabled capabilities. The chapter demonstrated that choice is informed by many factors including the demographic and personal factors discussed in chapter four.

The next chapter discusses the development outcomes derived from the use of the new technologies by the low-income households through the choices they make in relation to the eight enabled capabilities.

Chapter 6:

Development Outcomes of Using New Technologies and Linkage to Quality of Life

6.1 Introduction

Sen (1999) emphasized the need for freedom of choice and argued that increase in choices did not necessarily lead to an increase in freedom, because the freedom added may not necessarily be the one valued. In addition, the option to live a peaceful and unbothered life may be lost. Heeks (2002) has argued that views on ICT and development can be placed in a continuum, from the optimists, who associate them with positive outcomes, to the pessimists who associate them with negative outcomes.

This chapter examines the development outcomes of using the new technologies derived from the enabled capabilities discussed in chapter five. It highlights the low-income households' perceptions of a good quality of life and its key attributes. The chapter discusses what the low-income households perceive to be attributes of a good quality of life and the role they see the new technologies playing in achieving their desired quality of life. The chapter demonstrates the link between the development outcomes of using the new technologies and the desired quality of life. The chapter concludes by giving a recap of the findings.

6.2 Derivation of Development Outcomes

The eight enabled capabilities from the use of the new technologies that informed the study scope (see Table 2) and discussed in Chapter 5 were subjected to public discussions through the survey (2010). This was to confirm whether they were valued capabilities by the low-income households from the three clusters, and to establish the development outcomes derived from the enabled capabilities. Table 5 showed the eight enabled capabilities listed to ensure that all their aspects were covered. For each

enabled capability, possible opportunities to individuals and households due to use of the new technologies were detailed. Further, all possible development outcomes were predicted and detailed indicators that would assess the presence of a development outcome enumerated.

This guided the selection and inclusion of questions for the survey (2010) tool. For each of the eight enabled capabilities, a question was asked to find out the development outcomes of using the Internet and mobile phone. Further, the respondents were asked the positive and negative ways the Internet and mobile phones had influenced their households' social, economic and knowledge development. The responses were typed in a spreadsheet and the key themes that emerged classified. The analysis established twelve development outcomes in the knowledge, economic and social dimensions as outlined below:

- Knowledge development outcomes:
  - Enhanced skills and individual productivity, informed and knowledgeable households, and information overload
- Economic development outcomes
  - Increased income (improved business), employment and job creation, and job losses and retrenchment
- Social development outcomes
  - Social connections and inclusion, enhanced social status and self-esteem, enhanced security, technology induced conflict and dishonesty, exacerbation of criminal activities, and intrusion to privacy

In the derivation of the development outcomes, the study presumed that individuals were rational beings who made rational choices to maximize on enabled capabilities to derive maximum valuable development outcomes. All that a person was capable of doing and being presumably was converted to development outcomes within the individuals' circumstances. Not all the predicted development outcomes made it to the final list of the twelve development outcomes. Further, development outcomes that had

not been predicted emerged (see Table 5). The twelve development outcomes were regarded as positive development outcomes while others were negative development outcomes. The study acknowledges that the classification would be subjective based on the lenses interpreting the outcomes. The study notes that there is rarely a direct causal link between the new technology intervention in development and the benefits realized because of the multiple roles played by the technologies in the development process. The three development dimensions, the eight enabled capabilities due to use of the new technologies and the twelve derived development outcomes are shown (see Table 16).

Table 16: Enabled Capabilities and Development Outcomes

	Development Dimensions	Enabled Capabilities	Development Outcomes
1	Knowledge	➢ Skills and individual productivity ➢ Knowledge accumulation and dissemination	➢ Enhanced skills and individual productivity ➢ Informed and knowledgeable households ➢ Information overload
2	Economic	➢ Income change ➢ Jobs and Employment access	➢ Increased Income (Improved business) ➢ Employment and job creation ➢ Job losses and retrenchment
3	Social	➢ Communication and information access[6] ➢ Social status: - Inclusion and exclusion ➢ Security ➢ Privacy and intrusion	➢ Social connections and inclusion ➢ Enhanced social status and self esteem ➢ Technology induced conflicts and dishonesty ➢ Enhanced security ➢ Exacerbation of criminal activities ➢ Intrusion to privacy

6.3 Development Outcomes of New Technologies in LIH

A number of studies have shown that ICT can contribute towards poverty reduction (Braun, 2009) while others have expressed caution (Arunachalam, 2004). Walsh and White (2006) argued that use of the new technologies has the potential to result in positive and negative development outcomes. Twelve development outcomes in the

[6] Contributed to social connections, informed and knowledgeable households; and information overload.

social, economic and knowledge dimensions were derived in this study (see Table 16). The study views positive development outcomes as; enhanced skills and individual productivity, informed and knowledgeable households, increased income, employment and job creation, social connections and inclusion, enhanced security, and enhanced social status and self-esteem while the negative development outcomes as information overload, job losses, technology induced conflicts and dishonesty, exacerbation of criminal activities, and Intrusion to privacy. The study notes that the classification of whether the development outcome is positive or negative is subjective based on the lenses used to interpret the outcomes.

The development outcomes are discussed starting with knowledge, economic and social dimensions in that order. The study developed regression models and drew conclusions in the form of hypothesis at the end of each model, which are recommended for testing in subsequent research. While only the demographic factors are used in the models, personal factors were presumed present considering that a combination of these factors exist concurrently in a person as earlier discussed. For every development outcome, the study argues that choice which is a product of demographic factors and personal factors, in addition to other factors such as personal history, psychology, social norms, culture, and the wider environment played a significant role.

For each model, the regression coefficient (B), the p-value (sig), and the odds ratio (Exp(B)) are discussed. The *Hosmer & Lemeshow* p-values and *Nagelkerke* R^2 are given too where applicable.

Where the survey (2010) data is used to derive the models, the variables for the skills are not included since all the respondents indicated that they had mobile phone skills. In addition, in some models only the mobile phone models are given in view of the fact that mobile phones were being used for Internet and email access and the researcher felt that they adequately illustrated the findings.

6.3.1 Knowledge Development Outcomes

The study established three knowledge development outcomes namely informed and knowledgeable households, enhanced skills and individual productivity, and information overload. The three development outcomes are discussed below.

Informed and Knowledgeable Households

There exists both tacit and explicit knowledge. People preserve the tacit aspects of knowledge that formal systems cannot capture, turn into information and make it public (Sreekumar et. al., 2008). The new technologies are widely used for news and information access. They allow access to a vast amount of information and knowledge available online and in people, leading to informed and knowledgeable households. The new technologies have provided opportunities for households to build their tacit knowledge through this information. This has enabled low-income households to generate and access local knowledge allowing them to understand and cope with the emerging social-economic challenges.

To determine how age, income, gender, marital status, education level and skills as independent variables influenced the outcome of information access through the use of Internet and mobile phones, the following regression models represent the findings.

Table 17: Information and Knowledge Access

Income level		***Internet model*** *Hosmer & Lemeshow p-value =0.78; Nagelkerke R^2 = 0.53 below Kshs. 23,671 and p-value =0.13; Nagelkerke R^2 =0.52 above Kshs. 23,672 inclusive.*			***Mobile phone model*** *Hosmer & Lemeshow p-value =0.16; Nagelkerke R^2 = 0 .66 below Kshs. 23,671 and p-value =0.57; Nagelkerke R^2 =0.33 above Kshs. 23,672 inclusive.*		
		B	**Sig.**	**Exp(B)**	**B**	**Sig.**	**Exp(B)**
below Kshs. 23,671	Age of household head	-0.01	0.69	0.991	-0.001	0.93	0.999
	Income of household	0.00	0.14	1.004	0.00	0.00*	1.006
	Gender of household head	-0.40	0.28	0.668	-0.16	0.42	0.852
	Marital status of household head	0.70	0.09	2.012	-0.54	0.01*	0.584
	Education of household head	0.06	0.026*	1.065	0.07	0.02*	1.067
	Skills of household head	4.11	0.00*	61.16	3.73	0.00*	41.47
	Constant	-5.53	0.00	0.004	-2.67	0.00	0.069
Above Kshs. 23,672	Age of household head	0.07	0.064	1.070	-0.001	0.98	0.999
	Income of household	0.02	0.39	1.050	0.08	0.22	1.802
	Gender of household head	-0.33	0.47	0.722	-0.77	0.12	0.464
	Marital status of household head	0.61	0.34	1.836	-0.88	0.17	0.415
	Education of household head	0.09	0.023*	2.915	0.01	0.95	1.005
	Skills of household head	21.77	1.00	2.837	2.954	0.000	19.19
	Constant	-22.82	0.1	0.000	-0.512	0.693	0.599

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Education and skills had statistically significant influence on the development outcome of informed and knowledgeable households using the Internet while income, marital status, education and skills had statistically significant influence using the mobile phone. For those with income of Kshs. 23,672 and above, education was the only variable with statistically significant influence, and only on Internet usage. Skills had the most influence for both the Internet and mobile phone usage and age had the least influence for both technologies as demonstrated by the magnitude of their **B** and **Exp(B)** coefficients. Presence of skills increased the odds of using the Internet and mobile

phones for information and knowledge access with factors of 61.16 and 41.47 respectively. The study notes that skills played a dominant role too for the respondents with income of Kshs. 23,672 and above even though the influence was not statistically significant.

From table 17, a conclusion is drawn that *younger single male household heads with secondary education and above plus Internet skills had higher odds of deriving the development outcome of information and knowledge access using the Internet than those with a different combination of the six factors. In addition, younger married male household heads with secondary education and above plus mobile phone skills had higher odds of deriving the development outcome of information and knowledge access using the mobile phone than those with a different combination of the six factors. Skills played the greatest role in deriving the development outcome of information and knowledge access with* ***B*** *coefficients of 4.11 and 3.73 for the Internet and mobile phones respectively.*

The finding shows that presence of skills and increased years of education significantly increased the odds of deriving the development outcome of information and knowledge access across the income levels and in particular using the Internet. The male respondents used the new technologies for information and knowledge access more than the female respondents did. This confirms the literature reviewed and discussions in chapter four.

Enhanced Skills and Individual Productivity

Faster access to more accurate information helps low-income households to directly increase their productivity through more productive use of time saved by placing a call or sending an email. The mobile phones in particular complement broadcasting stations both audio and visual in terms of critical information dissemination that saves on productive time. Television and radio stations broadcast reports on traffic conditions

and accidents benefiting thousands of people including those from low-income households.

On whether the respondents had acquired new skills using the new technologies, 20 per cent of the respondents indicated that they had acquired new skills using the Internet while 67.5 per cent had acquired using mobile phones. The use of Internet for e-learning was marginal with only 10 per cent of the respondents having done e-learning courses and 17.5 per cent willing to consider enrolling. Over 90 per cent of the respondents used mobile phone money transfer services and 77.5 per cent used their mobile phone for saving money. The respondents used the new technologies in particular the mobile phones for e-banking services such as money transfer. This improved their productivity. A respondent said, "I don't need to go to the bank; I receive payments and pay suppliers and employees through M-PESA making business easier."[9]

As at the time of the study, there were four mobile money transfer systems in Kenya, each run by a mobile phone operator. Starting with the M-PESA system launched by Safaricom in 2007and later joined by Zain's Zap (currently Airtel) in 2009, Yu's Yu Cash in 2009, and Orange Money by Telkom in 2010; mobile money had become common to Kenyans extending financial access to a wide population. By February 2010, 91.67 per cent of the respondents had used money transfer services and by the end of 2010, mobile money customers had reached 15 million (Safaricom, 2010). The mobile phone services were used to pay bills such as water and electricity. Payment for rendered services and purchase of goods from supermarkets was also done using mobile money. This improved productivity since individuals were able to avoid long queues when paying for utility bills and in automated teller machines (ATM) when accessing shopping money.

On whether use of mobile phones had enhanced the respondents' skills and individual productivity using the mobile phone to demonstrate, the following model was derived.

Table 18: Enhanced Skills and Individual Productivity through Mobile Phone

		Hosmer & Lemeshow p-value =1; Nagelkerke R^2 = 0.63 below Kshs. 23,671 and p-value =0.1; Nagelkerke R^2 =0.34 above Kshs. 23,672 inclusive.		
ncome evel		**B**	**Sig.**	**Exp(B)**
elow shs. 3,671	Age of household head	-0.48	0.40	0.619
	Income of household	0.00	0.89	1.008
	Gender of household head	-19.26	0.99	0.001
	Marital status of household head	17.04	0.99	2.517
	Education of household head	1.37	0.05*	3.924
	Skills of household head	-	-	-
	Constant	-23.73	0.99	0.000
bove shs. 3,672	Age of household head	-0.01	0.81	0.987
	Income of household	0.03	0.72	1.010
	Gender of household head	-2.61	0.17	0.074
	Marital status of household head	0.88	3.92	2.421
	Education of household head	0.35	0.04*	1.705
	Skills of household head	-	-	-
	Constant	5.67	0.39	291.23

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Table 18 shows that education is the only variable that had statistically significant influence on the development outcome of enhanced skills and individual productivity through the use of mobile phone. This applies for the respondents with an income of Kshs. 23,672 and above too.

The **B** and **Exp(B)** coefficients show that increment in one year of education increased the odds of the development outcome with a factor of 3.924 and **B** coefficient of 1.37. Gender had the most influence with **B** coefficient of -19.26 and **Exp(B)** of 0.001 an indication that the odds of females deriving the development outcome were less than those of the males. Marital status had a large influence too. Worth noting is that while table 10 showed that married people were using mobile phones more than the single

people, table 18 shows that the odds of single people enhancing their skills and individual productivity using the mobile phone were more. High education increased the odds of having skills in advanced features of the new technologies. Those with secondary and university levels of education used productive features of the new technology such as e-commerce and e-learning which were likely to improve their productivity (see Figures 10 and 11).

From table 18, a conclusion is drawn that *younger single males with secondary education and above had higher odds of deriving the development outcome of enhanced skills and individual productivity from using mobile phones than respondents with a different combination of the factors. Gender played the most significant role in deriving the development outcome of enhanced skills and individual productivity with* ***B*** *coefficient of -19.26.*

Information Overload

The study viewed this outcome as a negative development outcome of the new technologies. While the new technologies led to informed and knowledgeable households, 42 per cent and 55 per cent of the respondents indicated that use of Internet and mobile phone respectively resulted to information overload. Respondents indicated that due to ease and fast communication facilitated by the new technologies, unverified information circulated misinforming recipients. A question that sought to find out if respondents found Internet and mobile phone as sources of information overload derived the following regression models (see Table 19).

Table 19: Information Overload through Internet and Mobile Phones

		Internet model *Nagelkerke R^2 = 0.87 below Kshs. 23,671 and 0.77 above Kshs. 23,672 inclusive.*			Mobile phone model *Nagelkerke R^2 = 0.43 below Kshs. 23,671 and 0.4 above Kshs. 23,672 inclusive.*		
ncome evel		**B**	**Sig.**	**Exp(B)**	**B**	**Sig.**	**Exp(B)**
elow shs. 3,671	Age of household head	0.03	0.74	1.033	-0.001	0.97	0.999
	Income of household	0.00	0.75	1.000	0.00	0.93	1.000
	Gender of household head	17.99	0.99	6.551	0.13	0.85	1.139
	Marital status of household head	-20.26	0.99	0.654	0.31	0.66	1.360
	Education of household head	-0.89	0.55	0.410	-0.22	0.11	0.805
	Skills of household head	-36.35	0.99	0.198	-	-	-
	Constant	-25.91	0.99	0.000	1.99	0.40	7.306
bove shs. 3,672	Age of household head	0.14	0.64	1.154	-0.001	0.97	0.999
	Income of household	0.04	0.42	1.070	0.70	0.13	1.009
	Gender of household head	1.83	0.78	6.219	1.37	0.34	3.921
	Marital status of household head	-20.33	0.99	0.000	-0.41	0.78	0.666
	Education of household head	-0.92	0.66	0.399	0.33	0.92	1.029
	Skills of household head	39.56	0.99	1.512	-	-	-
	Constant	-30.05	0.99	0.000	-1.55	0.68	0.212

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

All the six variables did not have statistically significant influence on the development outcome of information overload through the use of Internet and mobile phones.

The **B** and **Exp(B)** coefficients show that Internet skills, followed by marital status and then gender had the most influence. This order applies too for the households with income of Kshs. 23,672 and above. For the mobile phone, marital status and education level had the most influence in both income categories. Single people, despite using Internet more than their married counterparts as demonstrated in table 10, had less odds of deriving the development outcome of information overload. Further, while married people were using the mobile phones more than the single people, they had less odds of deriving the development outcome of information overload as

demonstrated in table 19. Using figure 11, a conclusion can be drawn that since single people were using the Internet and email more than the married people were, chances were that they had acquired more skills in using the technologies hence derived their valued benefits. As a result, they were able to eliminate chances of information overload.

The findings show that education and skills were key to productive use of the Internet. Wahid et al. (2006) found that with higher education, Indonesians used the Internet for instrumental purposes such as information seeking and research. The finding shows that the female respondents derived the development outcome of information overload more than the males. The females had lower levels of education compared to the males (see Table 13). Since increased years of education decreased the odds of the development outcome, this could explain why the females had higher odds of deriving the development outcome of information overload.

*A conclusion is drawn that older married female respondents with below secondary education and Internet skills derived the development outcome of information overload through the Internet more compared with those with other combinations of the factors. Further, younger single females with below secondary education had higher odds of deriving the development outcome of information overload through the mobile phone than those with other combinations of the factors. The finding shows that skills was the main influencing factor in deriving the development outcome of information overload using Internet with **B** coefficient of -36.35 while marital status was the main influencing factor in deriving the development outcome of information overload using mobile phone with **B** coefficient of 0.31.*

The findings from the knowledge dimension of development show that there is a relationship between the three development outcomes. Informed and knowledgeable households through information access using the new technologies had enhanced skills and individual productivity. However, they were prone to information overload. Of interest to note is that the development outcome of informed and knowledgeable

households through information access using the new technologies, and the development outcome of enhanced skills and individual productivity were prone to happen to the male respondents. The two development outcomes were enhanced by high levels of education while the development outcome of information overload though the new technologies had high odds of happening to the female respondents and it was enhanced by low level of education. The conclusion drawn is that high level of education enhanced the positive development outcomes in the knowledge dimension of development.

6.3.2 Economic Development Outcomes

Silva and Zainudeen (2008) in their research to analyze perceived economic benefits of direct access to mobile phones among the poor in emerging Asia signaled caution on overestimation of anecdotal evidence. They found that actual user perceptions of economic benefits via direct access to mobile phones cannot be interpreted in a straightforward manner. Mpogole (2009) found evidence from Tanzania to support this finding.

The study identified three development outcomes under economic development namely: employment and job opportunities; increased income; and job losses and retrenchment.

Employment and Job Opportunities

Of the respondents, 72.5 per cent and 15 per cent indicated that mobile phones and Internet respectively had led to job creation. M-PESA services which have agents based across the country and majority in the low-income areas, where population is high, have led to job opportunities particularly to the young people. By April 2011, there were 27,988 agents country wide an indication that an equivalent number of jobs or more had been created within 5 years of M-PESA existence considering that in most cases there are more than one employee in most of the agents shops (Safaricom,

2011). In addition, there are dealers of prepaid phone cards and communication accessories across the country. The Internet has created employment for the youth as Internet trainers in the cyber cafés and other community access centers. A respondent said, "If more people used the Internet, jobs would be created – whether at the service providers, cybercafés, selling airtime or repairing computers and modems." [10]

The following regression model presents the response from a question that sought to find out if the respondents would use the Internet and mobile phones if they would help them get a job.

Table 20: Access to Job Opportunities

		Internet model *Hosmer & Lemeshow p-value =0.95; Nagelkerke R^2 = 0.48 below Kshs. 23,671 and p-value =0.97; Nagelkerke R^2 =0.35 above Kshs.23,672 inclusive.*			***Mobile model*** *Hosmer & Lemeshow p-value =0.06; Nagelkerke R^2 = 0.48 below Kshs. 23,671 and p-value =0.55; Nagelkerke R^2 =0.19 above Kshs.23,672 inclusive.*		
ncome evel		**B**	**Sig.**	**Exp(B)**	**B**	**Sig.**	**Exp(B)**
Below Kshs. 23,671	Age of household head	-0.004	0.849	0.996	-0.010	0.246	0.991
	Income of household	0.000	0.231	1.000	0.000	0.000*	1.000
	Gender of household head	0.064	0.838	1.066	-0.048	0.779	0.953
	Marital status of household head	0.305	0.383	1.356	-0.405	0.024*	0.667
	Education of household head	0.194	0.001*	1.214	0.052	0.029*	1.054
	Skills of household head	19.37	0.008*	25.89	2.717	0.000*	15.137
	Constant	-22.88	0.986	0.000	-2.796	0.000	0.061
Above Kshs. 23,672	Age of household head	-0.046	0.142	0.955	-0.001	0.943	0.999
	Income of household	0.072	0.420	2.080	0.025	0.343	1.906
	Gender of household head	-0.874	0.028*	0.417	-0.565	0.122	0.568
	Marital status of household head	-0.338	0.549	0.714	-0.801	0.096	0.449
	Education of household head	0 258	0.003*	1.295	0.134	0.010*	1.143
	Skills of household head	20.023	0.998	49.658	1.502	0.004	4.492
	Constant	-22.06	0.997	0.000	-1.783	0.080	0.168

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Education and skills had statistically significant influence in deriving the development outcome of access to job opportunities via Internet while income, marital status, education and skills had statistically significant influence via the mobile phones.

The **B** and **Exp(B)** coefficients show that skills, marital status and education level had the most influence on the development outcome of accessing job opportunities using both the Internet and the mobile phones. Higher education and presence of skills increased the odds of the development outcome occurring. The odds of single people, deriving the development outcome of job access using the Internet were 1.356 higher than for the married people but 0.667 lower using the mobile phone. This supports figure 11, which showed that single people were using the Internet more than the married people and confirms table 10 that showed that single people were using Internet more than married but were using the mobile phone less than the married people.

From table 20, conclusion is drawn that *younger single female household heads, with secondary education and above, and Internet skills, had higher odds of deriving the development outcome of accessing job opportunities using the Internet than those with different combination of the factors. In relation to mobile phones, younger* married *male heads of households, with secondary level of education and above had higher odds of deriving the development outcome of accessing job opportunities using the mobile phone than those with different combination of the factors. Table 20 shows that skills had the most influence with **B** coefficient of 19.37 and 2.72 for Internet and mobile phone respectively in deriving the development outcome of accessing job opportunities using the Internet and mobile phones.*

Increased Income

Zainudeen (2008) and Souter (2005) have shown that people at the bottom of the pyramid do not use mobile phones for business purposes with preference given to face-to-face communication. This is however changing with new technologies expanding

the options of marketing, and sales of products and services in addition to wider market for purchases. Users' confidence has also grown with time. The new technologies have had an impact on income through lowered transaction costs. Use of Internet and mobile phone allow households to work 24/7 hours and to be in constant touch with their clients and suppliers leading to increased income.

A businessperson who specialized in second-hand clothes indicated that his suppliers called him on his mobile phone when a new batch arrived. He then contacted his clients based on what was in the batch since he had his clients' order profiles. A respondent said, "Communication is easier for business; saving money on travel". [11]

Another respondent indicated that he was likely to get more revenue if he remained accessible to his clients all the time. He said, "When I do not have a mobile phone, my business and relationships are hindered and limited and I end up losing out on business deals." [12]

In both instances, the mobile phone led to increased income. The study established that 52.5 per cent of the respondents used mobile phones for income generating activities. Of the respondents, 7.5 per cent indicated that use of Internet strengthened their relationship with clients and suppliers while 50 per cent and 35 per cent found the mobile phone to strengthen their relationships with clients and suppliers respectively. The responses from a question that sought to find out if the respondents found the mobile phone to save them money, increasing their income is presented in table 21.

Table 21: Increased Income through Mobile Phones

		Nagelkerke R^2 = 0.34 below Kshs. 23,671 and 0.62 above Kshs. 23,672 inclusive.		
Income level		**B**	**Sig.**	**Exp(B)**
below Kshs. 23,671	Age of household head	0.053	0.226	1.054
	Income of household	0.000	0.089	1.000
	Gender of household head	2.961	0.030*	9.33
	Marital status of household head	-0.043	0.965	0.958
	Education of household head	0.055	0.672	1.056
	Skills of household head	-	-	-
	Constant	-2.484	0.368	0.083
Above Kshs. 23,672	Age of household head	0.133	0.149	1.142
	Income of household	0.076	0.507	1.208
	Gender of household head	-1.817	0.323	0.162
	Marital status of household head	-20.23	0.999	0.000
	Education of household head	4.370	0.0426*	1.448
	Skills of household head	-	-	-
	Constant	-8.983	0.204	0.000

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Gender had statistically significant influence in deriving the development outcome of increased income through the use of mobile phones while education had statistically significant influence for those with income of Kshs. 23,672 and above.

Further, the **B** and **Exp(B)** coefficients show that gender had the most influence followed by education then age. The odds of females deriving the development outcome were 9.33 higher than for males. One-year increment in education increased the odds of the development outcome occurring with a factor of 1.056 and **B** coefficient of 0.055, significantly small compared to those with income of Kshs. 23,672 and above.

From table 21, a conclusion is drawn that *older married females with above secondary education level had higher odds of deriving the development outcome of increased income from usage of mobile phone than those with a different combination. The*

*finding shows that gender was the main influencing factor in deriving the development outcome of increased income with **B** coefficient of 2.96.*

Retrenchment and Job Losses

The study regarded this as a negative development outcome. The new technologies have introduced business process re-engineering that leads to retrenchment and job losses for those not able to cope with the changes. 40 per cent of the respondents indicated that use of the mobile phones had led to job losses while 7.5 per cent indicated that Internet had led to job losses. Due to dependency on mobile phones, there was anxiety and reduced performance when calls did not go through. This dependency had become an addiction to some of the respondents with 10 per cent and 52.5 per cent indicating that they could not stay away for a day from Internet and mobile phones respectively. The small per cent for the Internet could be explained by the fact that only a few of the respondents were using the Internet compared to those who were using the mobile phones (see Table 9).

While there was no question that could predict what combination of factors attracted this development outcome, qualitative data showed that this outcome affected households across age, income, gender, marital status, education, and skills with the younger respondents in formal and informal employment recording more incidences of job losses that could be linked to the new technologies. Where a policy existed that prohibited employees from using Internet and mobile phones for personal gains at their work places, being caught contravening the policy led to job losses. A respondent who was a casual laborer said,

> In some work places in industrial area, you cannot get in with a mobile phone. You leave it at the gate. They have observed a link between mobile phones use in workplace and the entry of thieves. If you are seen with a mobile phone in the work place or if you receive a call, you lose your job.[13]

Another respondent narrated,

> In my office, people are not expected to receive personal calls during working hours. Some people leave their work station after every few minutes to go and answer calls lowering their performances. People have lost jobs because of using mobile phones in the work place. [14]

The new technologies encouraged idleness such as playing games and downloading irrelevant information from the Internet. Access to sites not related to work was also highly stated with 25 per cent of the respondents indicating use of Facebook as a hobby they engaged in at their work places. Incoming mobile phone calls took precedence over ongoing work interfering with formal work processes. Some respondents indicated that it was becoming very challenging to separate personal and business work when using the new technologies.

Some of the job losses were because of the fast delivery of information through the new technologies and in particular the mobile phones. A person would be alerted of a job opening prompting them to leave their jobs hastily only to realize that other people had been alerted of the same job and only one person was needed. A respondent said, "Some people are called and told there is a better job opening somewhere. They promptly resign from their job sometimes in bad terms only to find that there was no job or someone else got it." [15]

The findings from the economic dimension of development show that there is a relationship between the three development outcomes. Employment and job opportunities enhanced functioning of increased income through improved business opportunities. However, it also led to job losses and retrenchment for those not able to adjust and fit into the new opportunities or not able to use the new technologies productively to enhance their activities.

6.3.3 Social Development Outcomes

The new technologies improve quality of life through enhancing social development. In the social dimension of development, six development outcomes were identified, three of which the study regarded as positive development outcomes and three as negative

development outcomes. The positive development outcomes are social connections and inclusion, enhanced social status, self-esteem, and enhanced security. The negative development outcomes are technology induced conflicts and dishonesty, exacerbation of criminal activities, and intrusion to privacy.

Social Connections and Inclusion

In the context of the emerging global knowledge society, the new technologies are of interest in development. There is a potential risk of greater social and economic exclusion faced by those who cannot access or benefit from them. The friendly by-second billing system and small denomination scratch cards by the mobile phone operators have led to the inclusion of the excluded.

Communication was the main use of mobile phones with 95 per cent and 32 per cent of the respondents indicating that they used the mobile phones and email respectively to communicate with family members, while 97.5 per cent and 45 per cent used mobile phones and email respectively to communicate with friends. This conforms to Donner (2007) findings after considering the call behavior of 277 Rwandan micro-entrepreneurs, based on the call logs on their mobile phones and found that majority of the calls were social. With mobile phones playing a key role, the new technologies have blurred distance and offered households a convenient way of remaining in close contact with friends and relatives. A respondent said,

> The mobile phone and Facebook have helped me in reuniting with old friends and keeping in touch with them. I have also made new friends. I have become closer with my grandmother because we can talk anytime instead of sending greetings over the radio.[16]

This study shows that people participate in social networking sites to develop new relationships, maintain old friendships, and expand their social networks. The rapid growth of mobile phones and Internet based social networking in Kenya shows the growing importance of this aspect. A respondent said, "I have been able to shape my

life because I used to drink a lot but now I use Facebook to communicate with my friends instead of going to drink." [17]

The use of mobile phones had strengthened the relationship of 97.5 per cent of the respondents with friends and family while 22.5 per cent and 12.5 per cent found usage of Internet to strengthen their relationships with friends and family respectively. However, respondents reported reduced face to face interactions between family members due to mobile money transfer services. The most direct benefits of mobile money are the greater convenience and security, greater transfer speed, and lower cost of transferring funds. Before the introduction of money transfer services, money was sent through friends and family, via public services such as a bus, or through the Post Office and Western Union, mainly from urban to rural areas. These methods took time and posed a risk that the funds would be stolen or lost along the way. With the mobile money transfer service, both the sender and receiver are given instant feedback that the transfer has been made. Those who used to go to their rural areas at the end of the month to give money to their family were now using mobile money transfer. A respondent said, "Sending money through M-PESA to those who live far from me saves me travel time and money. I save money by calling someone instead of physically going to see them." [18]

Respondents were also using the mobile phones to complement physical social groups. For instance, married women in the three clusters belonged to a "chama" or "merry-go-round" and when they could not make it for the meetings, they sent money through mobile money creating a sense of inclusion.

On whether the new technologies made respondents to feel included in the various social groups, 95 per cent of the respondents indicated that mobile phones made them feel included. The following regression model demonstrates this finding.

Table 22: **Inclusion in Social Groups through Mobile Phones**

		Hosmer & Lemeshow p-value =0.35; Nagelkerke R^2 = 0.66 below Kshs. 23,671 and p-value =0.43; Nagelkerke R^2 =0.32 above Kshs. 23,672 inclusive.		
ncome evel		**B**	**Sig.**	**Exp(B)**
elow Kshs. 3,671	Age of household head	-0.002	0.847	0.998
	Income of household	0.000	0.000*	1.000
	Gender of household head	-0.151	0.423	0.860
	Marital status of household head	-0.595	0.002*	0.551
	Education of household head	0.066	0.010*	1.069
	Skills of household head	3.772	0.000*	43.48
	Constant	-2.642	0.000	0.071
Above Kshs. 23,672	Age of household head	0.004	0.877	1.004
	Income of household	0.000	0.227	1.000
	Gender of household head	-0.772	0.101	0.462
	Marital status of household head	-0.816	0.189	0.442
	Education of household head	0.007	0.914	1.007
	Skills of household head	2.858	0.000	17.435
	Constant	-0.593	0.636	0.552

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Income, marital status, education and skills had statistically significant influence in deriving the development outcome of inclusion in social groups through the use of mobile phones. The **B** and **Exp(B)** coefficients show that an increase of income by one Kenya shilling (1 Ksh.) did not increase or decrease the odds of deriving the development outcome. The odds of single people deriving the development outcome were less than the odds of married people by 0.551 and **B** coefficient of -0.595. This is in line with table 10, which showed that married people were using the mobile phones more than the single people were. One-year increment in education increased the odds of the development outcome with a factor of 1.069 and **B** coefficient of 0.066. The odds of those who had skills deriving the development outcomes were 43.48 higher than the odds of those without skills with **B** coefficient of 3.77.

From table 22, a conclusion is drawn that the odds of younger married males with below secondary education and source of income feeling included in social groups through mobile phones were higher than of those with a different combination of the factors. The finding shows that skills were the main influencing factor in deriving the development outcome of social connection and inclusion with ***B*** *value of 3.77.*

Enhanced Security Response

The enhanced security provided by mobile phones' ability to dial emergency numbers promptly created a better business environment, leading to a better quality of life. Mobile phone operators used the technology to track down criminals. Of the respondents, 72.5 per cent had used mobile phones in emergencies and 10 per cent had used Internet. They ensured security in the neighborhood through constant communication with their neighbors using mobile phones. A respondent said,

> I used the mobile phone in an emergency when a neighbor left food cooking and went to the shopping centre where she delayed. The food started burning and there was a possibility of fire outbreak. I used my mobile phone to alert her and she hurried back just in time. [19]

A respondent indicated that a mobile phone saved her life when she felt sick, redialed the last number she had called, and got help. Another respondent indicated that a power cable was sparking and he used a mobile phone to alert the utility company, Kenya Power and Lighting Company (KPLC), who responded promptly and averted a possible disaster. The Internet and mobile phones improved security through providing a secure place for document storage and easy way of carrying cash. A common theme was improved safety because thieves had learnt that few people carried large amount of cash. Of those interviewed in the survey (2010), 90 per cent had used a mobile phone for money transfer services while 77.5 per cent had used for money storage. 2.5 per cent of the respondents had used Internet for money transfer and 12.5 per cent for document storage.

From a question that sought to find out if the respondents had used a mobile phone for emergency response, the following regression model emerged.

Table 23: Use of Mobile Phones for Emergency Response

		Hosmer & Lemeshow p-value =0.304; Nagelkerke R^2 = 0.49 below Kshs. 23,671 and p-value =0.69; Nagelkerke R^2 =0.30 above Kshs. 23,672 inclusive.		
ncome evel		**B**	**Sig.**	**Exp(B)**
elow Kshs. 3,671	Age of household head	-0.006	0.477	0.994
	Income of household	0.000	0.008*	1.000
	Gender of household head	-0.017	0.920	0.983
	Marital status of household head	-0.418	0.018*	0.659
	Education of household head	0.040	0.086	1.041
	Skills of household head	2.785	0.000*	16.20
	Constant	-2.685	0.000	0.068
Above Kshs. 23,672	Age of household head	0.011	0.650	1.011
	Income of household	0.058	0.116	1.007
	Gender of household head	-0.217	0.589	0.805
	Marital status of household head	-0.123	0.822	0.884
	Education of household head	-0.067	0.287	0.935
	Skills of household head	3.126	0.000*	22.785
	Constant	-1.650	0.186	0.192

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Income, marital status, and skills had statistically significant influence in deriving the development outcome of enhanced security response through mobile phones. Only skills had statistically significant influence for the respondents with income of Kshs. 23,672 and above.

The **B** and **Exp(B)** coefficients show that an increase of income by one Kenya shilling (1 Ksh.) did not increase or decrease the odds of deriving the development outcome. The odds of single people deriving the development outcome were less than the odds of married people by 0.659 and **B** coefficient of -0.418. The odds of those with skills

deriving the development outcome were 16.20 higher than the odds of those without skills with **B** coefficient of 2.79.

*From Table 23, a conclusion is drawn that younger married male household heads with above secondary education and mobile phone skills had higher odds of using the mobile phone for emergency response than those with a different combination of the factors. The finding shows that skills was the main influencing factor in deriving the development outcome of enhanced security response with **B** coefficient of 2.79.*

Enhanced Social Status and Self-Esteem

People tend to look for sophisticated features such as 3rd generation (3G), multimedia messaging service (MMS), general packet radio service (GPRS) and Internet, as the mobile phone has become a status symbol. Studies have shown that using a mobile phone, particularly one with advanced technological features, symbolizes status among peers (Ozcan & Kocak, 2003). This is a form of identity expression by most users. A respondent said "I have gained respect because of the ease of communication; I am readily available to talk with family and friends." [20]

Respondents considered owning a mobile phone to be fashionable. They indicated that a household with no mobile phone was disgraced by neighbors, which led to a feeling of isolation. For some people, a mobile phone defined their status and believed that they were judged by the society based on the kind of mobile phone they owned and in some cases, how many. Having the "right mobile phone" by their own standards boosted their level of confidence and sense of importance. An expensive taste required a large amount of resources to satisfy unlike inexpensive tastes. A respondent said,

> I had an expensive mobile phone which a friend conned off me, to a less expensive one. When I had that phone, I was respected. However, nowadays I do not feel respected because of my cheap phone that I feel ashamed of when I receive a call in front of my friends. [21]

Of the respondents, 22.5 per cent and 77.5 per cent found Internet and mobile phones respectively to enhance their sense of style. Fifteen per cent (15%) indicated that they felt respected by their peers due to use of Internet and 62.5 per cent felt respected due to use of mobile phones. The following regression model is derived from a question that sought to find out if respondents felt respected due to owning a mobile phone leading to a feeling of enhanced social status and self-esteem.

Table 24: Mobile Phone and Respect from Peers

		Hosmer & Lemeshow p-value =0.71; Nagelkerke R^2 = 0.47 below Kshs. 23,671 Hosmer & Lemeshow and p-value =0.35; Nagelkerke R^2 =0.18 above Kshs. 23,672 inclusive.		
ncome evel		**B**	**Sig.**	**Exp(B)**
elow Kshs. 3,671	Age of household head	-0.013	0.113	0.987
	Income of household	0.000	0.002*	1.000
	Gender of household head	0.073	0.671	1.076
	Marital status of household head	-0.377	0.036*	0.686
	Education of household head	0.059	0.015*	1.061
	Skills of household head	2.778	0.000*	16.084
	Constant	-2.798	0.000	0.061
Above Kshs. 23,672	Age of household head	0.006	0.759	1.006
	Income of household	0.000	0.034*	1.000
	Gender of household head	-0.074	0.835	0.929
	Marital status of household head	0.140	0.773	1.150
	Education of household head	-0.069	0.193	0.933
	Skills of household head	2.026	0.001*	7.581
	Constant	-1.435	0.191	0.238

Source: RIA (2007) Database

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Income, marital status, education level and skills had statistically significant influence in deriving the development outcome of enhanced social status and self-esteem. The **B** and **Exp(B)** coefficients show that an increase of income by one Kenya shilling (1 Ksh.) did not increase or decrease the odds of deriving the development outcome.

The odds of single people deriving the development outcome were less than the odds of married people with a factor of 0.686 and **B** coefficient of -0.377. One-year increment in education increased the odds of the development outcome with a factor of 1.061 and **B** coefficient of 0.059. The odds of those who had skills deriving the development outcomes were 16.084 times higher than the odds of those without skills and **B** coefficient of 2.78.

*From table 24, a conclusion is drawn that the odds of young married female household heads with above secondary education deriving the development outcome of enhanced social status and self-esteem were higher than for those with a different combination of the factors. The finding shows that skills was the main influencing factor in deriving the development outcome of enhanced social status and self-esteem with a **B** coefficient of 2.78. Marital status had a huge influence too.*

Intrusion to Privacy

Mobile phones are embedded with several features that enable multiple functions including digital camera to capture digital content. Their use in public places to take pictures of friends or strangers without their consent is increasingly becoming a habit with the emergence of mobile phones loaded with camera features. This makes information dissemination quite rapid. However, some information is personal and may be accessed by unauthorized persons or used for the wrong purpose leading to infringement of individuals and households' right to privacy. Moreover, some users carelessly expose their Personal Identification Numbers (PIN).

Of the respondents, 17.5 per cent indicated that their privacy had been invaded using the mobile phones, while 25 per cent indicated that their privacy had been violated by members of their family using either mobile phones or the Internet. 7.5 per cent of the respondents had found their information circulating without their knowledge and had circulated other people's information without their knowledge using the mobile phones.

Respondents indicated that mobile phones had resulted to confidential breach where people discussed private and confidential things intentionally or otherwise in public places and along the streets. A respondent complained,

> You hear people discussing confidential things in public places such as supermarkets, in public service vehicles and along the corridors in offices without considering who is listening. [22]

Traditionally, public places and spaces have been used as a vacuum zone for traffic purposes. However, the mobile phones have made these places to be areas of formal and informal interactions. Restaurants, hotel lobbies, supermarkets and many other places not committed to specific purposes have become encroached by the mobile phone nuisance. SMS was considered useful to stay in touch with people because the intended recipients' accessed messages without anybody else taking notice of the content and they could read at their convenience. This privacy contrasts with mobile phone calls, which could come in completely unpredictable environments with unwelcome third parties.

Mobile phone users experience awkward situations sometimes when they receive calls since there are no standing rules prescribing how contradictions can be reconciled. For instance, an employee called by the boss while in a social gathering has to manage the challenging call whose purpose and emotional registers are not in alignment with the situation. Of the respondents, 17.5 per cent indicated that their employer used mobile phone to monitor and control them infringing on their privacy. Some employees were expected to be reachable 24/7 by their employers. Mobile phones were used to track them down and regardless of where they were and what they were doing, they were expected to answer calls. The mobile phone requires users to manage the intersection of the real present and the conversational present in a manner, that is mindful of both. Respondents indicated that weekends, vacations as well a sick leaves were no longer free from duties, because presumably, one is reachable.

A question that sought to find out if the mobile phones had been used to intrude on individuals' privacy derived the following regression model.

Table 25: Intrusion to Privacy through Mobile Phones

		Nagelkerke R^2 = 0.35 below Kshs. 23,671 and 0.49 above Kshs. 23,672 inclusive.		
ncome		**B**	**Sig.**	**Exp(B)**
elow shs. 3,671	Age of household head	0.060	0.272	1.062
	Income of household	0.000	0.176	1.000
	Gender of household head	0.873	0.453	1.418
	Marital status of household head	-1.986	0.040*	7.289
	Education of household head	-0.347	0.286	0.707
	Skills of household head	-	-	-
	Constant	6.898	0.215	990.502
bove shs. 3,672	Age of household head	0.239	0.169	1.269
	Income of household	0.604	0.589	1.809
	Gender of household head	3.382	0.231	29.438
	Marital status of household head	-21.217	0.999	16.386
	Education of household head	-1.029	0.177	0.357
	Skills of household head	-	-	-
	Constant	3.544	0.659	34.590

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Only marital status had statistically significant influence in deriving the development outcome of Intrusion to privacy through the mobile phone and only for those with income of Kshs. 23,671 and below. As noted from qualitative information, married respondents complained of Intrusion to privacy through the use of the new technologies. Gender and education had relatively high **B** coefficient of 0.873 and -0.347 respectively.

The **B** and **Exp(B)** coefficients show that the odds of single people deriving the development outcome were less than the odds of married people with a factor of 7.289 and **B** coefficient of -1.99 and that one year increment in education level reduced the odds of intrusion to privacy through the technology with a factor of 0.707.

From table 25, a conclusion is drawn that, *older married female with below secondary education had higher odds of encountering privacy intrusion through the mobile phones than those with a different combination of the factors. Marital status was the main influencing factor in deriving the development outcome of privacy intrusion through the use of mobile phone with* ***B*** *coefficient of -1.99 followed by gender.*

Technology Induced Conflicts and Dishonesty

In spite of the new technologies improving social connections, they were seen to constrain relationships across the ages. The ease of communication, leads to increased conflicts in the households and among friends. With the diffusion of mobile phones and private email accounts, mutual knowledge about each other's communication networks declines. A partner may have acquaintances and on-going interactions unknown to the other partner and family members. A respondent lamented,

> When I leave my phone, my husband scrolls to see if a man has called. If yes, he demands to know how we met. However, he has commanded me never to touch his phone. He is always interested to know who calls on my mobile phone and when he receives a call in my presence, he sometimes disconnects, which makes me feel bad. [23]

A research showed that men monitored the mobile phone and Internet use of their partners (Zainudeen & Iqbal, 2007). Of the respondents, 47.5 per cent and 17.5 per cent indicated that mobile phones and Internet had brought conflicts in their households respectively. They indicated that the new technologies had led to a dishonest society and promoted cheating in relationships leading to conflicts. "You have to make a choice between usage of the mobile phone and family integration," said a 28 year-old pharmacist. [24]

In some instances, mobile phones prevented or postponed conflicts. Female respondents commended the ability of mobile money in storing money safely. It not only kept the money safe from pickpockets, but more importantly from their spouses. They complained that when they had cash, their spouses and other family members

would take it away. However with the money in the mobile phone, they could claim either they did not have or refuse to give out leading to mixed outcomes. A respondent lamented,

> Mobile phone leads to conspicuous spending. People borrow your mobile phone to make calls because it has money and when you leave it without security code, they "Sambaza" (transfer) your credit which annoys me. [25]

There was no concrete question that was able to derive an ideal model to predict which group was more prone to the development outcome. However, a question on whether the respondents had ever felt violated through their mobile phone by members of the family that led to conflicts derived the following regression model.

Table 26: Conflicts Induced by Mobile Phones

		Nagelkerke R^2 = 0.36 below Kshs. 23,671 and 0.67 above Kshs .23,672 inclusive.		
ncome evel		**B**	**Sig.**	**Exp(B)**
elow Kshs. 3,671	Age of household head	0.113	0.042*	1.119
	Income of household	0.000	0.204	1.000
	Gender of household head	0.814	0.405	1.443
	Marital status of household head	-1.887	0.049*	6.600
	Education of household head	0.070	0.596	1.072
	Skills of household head	-	-	-
	Constant	-1.084	0.714	0.338
Above Kshs. 23,672	Age of household head	0.417	0.088	1.518
	Income of household	0.046	0.698	1.080
	Gender of household head	7.320	0.096	15.102
	Marital status of household head	2.838	0.531	17.075
	Education of household head	-0.310	0.455	0.733
	Skills of household head	-	-	-
	Constant	-15.662	0.111	0.000

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

Age and marital status had statistically significant influence in deriving the development outcome of technology induced conflicts and dishonesty. The **B** and **Exp(B)** coefficients show that one year increment in age increased the odds of deriving the development outcome with a factor of 1.119 and **B** coefficient of 0.113. The odds of single people deriving the development outcome were less than the odds of married people with a factor of 6.6 and **B** coefficient of -.887. Qualitative data demonstrated that females particularly those married experienced more challenges in relation to usage of the new technologies within their family setups.

*From table 26, a conclusion is drawn that older married females with secondary education and above, had higher odds of deriving the development outcome of technology induced conflicts and dishonesty as victims than those with a different combination of the factors. The finding shows that marital status was the main influencing factor in deriving the development outcome of technology induced conflicts and dishonesty through the use of mobile phone with **B** coefficient of -1.887 followed by gender.*

Exacerbation of Criminal Activities

Rapid expansion of the use of the new technologies has resulted in insurgence of technology related crimes. Mobile phones being small yet highly priced are easy targets for thieves. Criminals use the new technologies to commit crimes ranging from fraud to use of the technologies for effective criminal activities. This negatively affects households considering that they are low-income households living in areas prone to criminal incidences. 75 per cent of the respondents indicated that mobile phones were an attraction to thieves while 55 per cent had been robbed a mobile phone.

A respondent who worked as a security guard indicated that he was afraid of turning on his mobile phone at night because it could alert criminals of his location. A woman respondent indicated that owning an expensive mobile phone limited ones' movement in some areas. She said,

> One cannot have an expensive phone in the neighborhood; I cannot answer calls in a matatu [public service vehicle] because I am always scared. Through KissFm the radio station, I got a mobile number of a person who claimed to be looking for people to train on computers. When I called the number, I was asked to M-PESA some money for the interview and I realized he was a conman. [26]

Robbers are taking advantage of the mobile phones making robbery easier through effective communication. Some observers have insinuated that the mobile phones are responsible for the spread of kidnapping incidences where abductors use the victims' mobile phone to demand for a ransom (Kamau, 2009). A respondent recounted,

> To feel safe, I change my number often because I have been threatened. People whom I do not know or did not give my number to, call me. I have received harsh and abusive phone calls that led to bad occurrences, which I would not have experienced if I did not have a mobile phone. [27]

While 30 per cent of the respondents were aware of fraud through the Internet, 5 per cent had been victims. For the mobile phones, 87.5 per cent were aware of fraud, while 22.5 per cent had been victims. On whether the respondents had lost a mobile phone to criminals, the following regression model was derived.

Table 27: **Loss of Mobile Phones to Criminals**

		Nagelkerke R^2 = 0.36 below Kshs. 23,671 and 0.41 above Kshs. 23,672 inclusive.		
ıcome evel		**B**	**Sig.**	**Exp(B)**
elow shs. 3,671	Age of household head	0.024	0.366	1.025
	Income of household	0.000	0.757	1.000
	Gender of household head	0.412	0.986	1.012
	Marital status of household head	0.156	0.819	1.169
	Education of household head	-0.023	0.826	0.977
	Skills of household head	-	-	-
	Constant	-0.529	0.795	0.589
bove shs. 3,672	Age of household head	0.033	0.591	1.033
	Income of household	0.678	0.586	1.056
	Gender of household head	2.0379	0.999	7.084
	Marital status of household head	-0.407	0.854	0.666
	Education of household head	-0.248	0.477	0.781
	Skills of household head	-	-	-
	Constant	-17.086	0.999	0.000

Source: Survey (2010)

** p-value is <0.05 meaning that influence is statistically significant at 95% confidence level.*

None of the six demographic factors had statistically significant influence in deriving the development outcome of losing a mobile phone to criminals because of exacerbation of criminal activities. The **B** and **Exp(B)** coefficients show that one year increment in age increased the odds of deriving the development outcome with a factor of 1.025 and **B** coefficient of 0.024. Increase of income by one Kenya shilling (1 Ksh.) did not increase or decrease the odds of deriving the development outcome. The odds of females deriving the development outcome were higher than the odds of males with a factor of 1.012 and **B** coefficient of 0.412. The odds of single people deriving the development outcome were higher than the odds of married people with a factor of 1.169 and **B** coefficient of 0.156. Increment in one year of education decreased the odds of the development outcome with a factor of 0.977 and **B** coefficient of -0.023.

From table 27, a conclusion is drawn that older single females with below secondary education had higher odds of losing their mobile phones through criminal related encounters than people with a different combination of the factors hence being victims of exacerbated criminal activities. The study notes that none of the six variables had statistically significant influence; however, gender had relatively more influence on the development outcome, with ***B*** *coefficient of 0.412.*

The six social development outcomes interrelated with each other. New technologies enhanced social connections and social inclusion influencing social status and self-esteem and leading to improved security response. However, there was increased privacy intrusion, household conflicts and dishonesty, and exacerbation of criminal activities as the negative development outcomes with the six demographic factors playing different roles in influencing the outcomes. The study observes that older female respondents were more prone to the negative social development outcomes.

Interpretation

From Table 17 to 27, the **B** coefficients of income were zero. This means that the role of income in influencing the various development outcomes was marginal. As earlier stated, this could be attributed to the fact that there was an upper limit to income at Kshs. 23,671 hence the range between the highest income and the lowest income was small. As noted, the findings from the households with income of Kshs. 23,672 and above showed income to play a role in the derivation of various development outcomes. The study further notes that marital status and gender played a relatively high influence on the social development outcomes in relation to other outcomes. Marital status was statistically significant in five of the six social development outcomes. This shows that the new technologies have a huge influence to households' relations. As demonstrated in figure 9, married people used the mobile phones more than the single people and they used the Internet and email less.

The findings have demonstrated the role of the demographic factors and personal factors in influencing the development outcomes. As earlier mentioned, the study premised that the development outcomes are a product of choices made by individuals and households on the use of the new technologies. The choice is influenced by demographic factors, personal factors, and other factors as demonstrated in the framework (see Figure 6). Different combinations of the factors led to varied development outcomes with one or two factors being prominent for the various development outcomes. This is an indication that a blanket rule cannot be used to determine the development outcome that would be derived from the usage of the new technologies by the low-income households in Kenya which confirms the assertions by Ramirez (2007) that there are many factors that determines how the new technologies are used dictating the derived outcomes.

Conclusion

From the findings, the third hypothesis is confirmed which stated that "***Development outcomes of using the new technologies are dictated by choice influenced by demographic and personal factors mediated through other factors.***" This leads to rejection of the null hypothesis (***H_0:***) concluding that choice which is a product of many factors determines the development outcomes derived from the usage of the new technologies.

The emergence of positive and negative development outcomes in the three dimensions of development that resulted from the diverse choices made by individuals' in relation to usage of the new technologies confirms Sen's (1999) argument. He emphasized the need for freedom of choice and argued that increase in choices did not necessarily lead to an increase in freedom, because the freedom added may not necessarily be the one valued, and in addition, the option to live a peaceful and unbothered life may be lost.

6.4 Role of Demographic Factors in Influencing the Development Outcomes

The **B** and **Exp(B)** coefficients of the six demographic factors from table 17 to 27 were summarized (see Table 28). The personal factors were presumed present in the individuals hence not used in the table but the study acknowledged their influence in determining the development outcomes. The researcher acknowledges the role of other factors such as personal history, psychology, social norms, culture, and the wider environment which were out of scope of the study, but influenced the choice made during the conversion process from enabled capabilities to development outcomes. This was discussed in section 5.4 and their influence demonstrated through the values of *Nagelkerke* R^2 which showed the extent to which the six demographic factors explained the variance in each of the development outcome.

The **p-values** (sig) of the six demographic factors indicated how statistically significant the variables were in determining the odds of the development outcome occurring. Where a factor was statistically significant, a star (*) on the **B** regression coefficient denotes the fact (see Table 28).

Table 28: Influence of Demographic Factors on Development Outcomes

Development outcomes		B Regression coefficients					
	Constant	Age	Income	Gender	M_ Status	Education	Skills
Information and knowledge access Internet	-5.53	-0.01	0.00	-0.40	0.70	0.06	4.11
Information and knowledge access Mobile	-2.67	-0.001	0.00*	-0.16	-0.54*	0.07*	3.73*
Improved skills and productivity	-23.7	-0.48	0.00	-19.26	17.04	1.37*	-
Internet: Information overload	-25.9	0.03	0.00	17.99	-20.26	-0.89	-36.35
Mobile phone: Information overload	1.99	-0.001	0.00	0.13	0.31	-0.22	-
Access to job opportunities via Internet	-22.9	-0.004	0.00	0.064	0.305	0.19*	19.37*
Access to job opportunities via mobile phones	2.796	-0.01	0.00*	-0.048	-0.405*	0.052*	2.72*
Increased income through mobile phone	-2.48	0.05	0.00	2.96*	-0.04	0.06	-
Inclusion in social groups through mobile phone	2.64	-0.002	0.00*	-0.15	-0.59*	0.07*	3.77*
Mobile phone use for emergency response	-2.68	-0.006	0.00*	-0.017	-0.418*	0.04	2.79*
Mobile phone and respect from peers	-2.8	-0.013	0.00*	0.073	-0.377*	0.059*	2.78*
Intrusion to privacy through mobile phones-victim	6.9	0.06	0.00	0.873	-1.99*	-0.35	-
Technology induced conflicts and dishonesty-victim	-1.08	0.11*	0.00	0.81	-1.89*	0.07	-
Exacerbation of criminal activities-victim	-17.1	0.02	0.00	0.41	0.16	-0.02	-

Source: RIA (2007) Database and Survey (2010)

* *p-value is <0.05 meaning that influence is statistically significant at 95% confidence*

From the findings, a template is derived that scholars could use to predict the odds of a development outcome occurring given the six independent variables (see Table 31). A positive sign shows that one unit increment in the independent variable leads to an increase in the odds of the development outcome occurring while a negative sign shows that one unit increment in the independent variable leads to a decrease in the odds of the development outcome occurring for the continuous variables. For the dummy variables, a positive sign shows that the reference variable has higher odds of occurring while a negative sign shows that reference variable has less odds of occurring. Table 6, which gave the description of the variables, should guide the use and interpretation of the template.

Table 29: Template for Likelihood Prediction of Development Outcomes

Development outcomes	B Regression coefficients					
	Age	Income	Gender	M_Status	Education	Skills
Information and knowledge access - Internet	-	0	-	+	+	+
Information and knowledge access - Mobile	-	0	-	-	+	+
Improved skills and productivity	-	0	-	+	+	*
Internet: Information overload	+	0	+	-	-	-
Mobile phone: Information overload	-	0	+	+	-	*
Access to job opportunities via Internet	-	0	+	+	+	+
Access to job opportunities via mobile phones	-	0	-	-	+	+
Increased income through mobile phone	+	0	+	-	+	*
Inclusion in social groups through mobile phone	-	0	-	-	+	+
Mobile phone use for emergency response	-	0	-	-	+	+
Mobile phone and respect from peers	-	0	+	-	+	+
Intrusion to privacy through mobile phones-victim	+	0	+	-	-	*
Technology induced conflicts & dishonesty-victim	+	0	+	-	+	*
Exacerbation of criminal activities-victim	+	0	+	+	-	*

* *Means variable not included in the equation*

+/- *Refer to table six for interpretation*

The variables of the six factors can be introduced to a different population and the likelihood of the development outcomes predicted while taking into account other factors that may contribute to the outcomes as earlier discussed.

6.5 Development Outcomes' Influence on Enabled Capabilities

The study argues that the development outcomes lead to more enabled capabilities hence the feedback arrow from the development outcomes to the enabled capabilities (see Figure 6). What one is able to "be" enhances what he is able to "do" as per Sens' analogy.

Sen (1999) argues that commodities and goods creates and expands the capability to function leading to *functioning* interpreted in this thesis as development outcomes. Clark (2003) reasons that in comparing the well-being of different people, not enough information is provided by looking only at the commodities each can successfully command. Instead we must consider how well people are able to function with the goods and services at their disposal. Development outcomes influenced the enabled capabilities through the use of the new technologies as demonstrated by the feedback arrow from development outcomes to the enabled capabilities.

The findings demonstrate that "doings" and "beings" which are the *functionings* enhances people's ability to function hence enabling capabilities. For instance, in the knowledge dimension of development, enhanced skills and individual productivity provided more options for knowledge accumulation and dissemination. In the economic dimension, employment and job creation through the new technologies expanded the options of job and employment access and likewise in the social dimension, being socially connected and included increased the options for communication and information access while creating a dilemma in relation to privacy and intrusion.

Further, the development outcome of enhanced skills and individual productivity enables and expands the capabilities of income change, better time management, and social interactions leading to social inclusion among others. In addition, the development outcomes have an influence on each other with for instance social connection and inclusion contributing to intrusion to privacy to some extent while at the same time enhancing self-esteem.

A conclusion is drawn that the development outcomes influences the capability set leading to an expansion of the enabled capabilities, confirming Sen's assertions. As earlier discussed, the three dimensions are interrelated and influence of the new technologies on one dimension have an impact on the other dimensions.

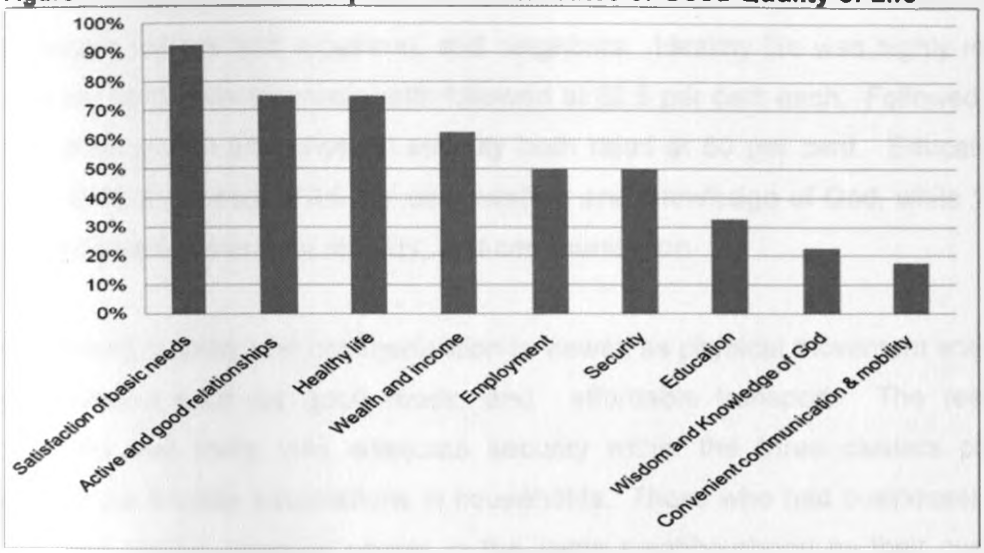
6.6 Perceptions of a Good Quality of Life in LIH

Quality of life is defined in relation to a person's capability 'to function'. This is in relation to what they are able 'to be' and 'to do' (capabilities), leading to their achieved 'beings' and 'doings' (development outcomes). Within the Capability Approach, achievement of quality of life is a process of interaction between the individual and her surrounding (Alkire, 2002). Thus, the set of potentially reachable states (capabilities) and that of those effectively realised (development outcomes) determine the quality of life of an individual or household.

A capability oriented perspective motivates a people centered approach to development in terms of quality of life explicitly and implicitly considering issues of empowerment, sustainability and impact which are major concerns of information and communication technologies for development practice and research (Heeks, 2009). The study established that households had different ideas of what constitutes a good quality of life influenced by demographic and personal factors earlier discussed. The study recognized the influence of other factors that were out of scope of the study. A combination of these factors dictated the choices made and development outcomes that emerged ultimately determining the person's quality of life. The households perceptions of a good quality of life affected the role they assigned to the new technologies and informed choices and actions they pursued to achieve their desired quality of life.

Respondents' were asked to list six key attributes that in their view contributed to their version of a good quality of life. While respondents identified substantive freedoms such as active and good relationships and having wisdom and knowledge of God, they equally regarded being employed and having easy access to basic needs, which are of instrumental value as part of the attributes of a good quality of life (see Figure 17).

Figure 17: Households' Perspectives of Attributes of Good Quality of Life



Source: Survey (2010)

As can be observed, the most highly rated attributes of good quality of life are social and economic. The knowledge attributes were relatively less rated. This means that the households valued highly the social attributes of quality of life, followed by the economic and finally the knowledge attributes. The study noted that despite the limited economic resources low-income households valued the social aspects of interaction with family and friends, with relationship rated at 75 per cent. Wealth and income was not the most highly rated, but satisfaction of basic needs, that was rated as the key attribute by 92.5 per cent of the respondents.

The International Labour Organisation (ILO) (1976) defined basic needs in terms of food, clothing, housing, education, and public transportation. The study recognizes that what constitute basic needs has been a subject of debate as argued by Townsend (1993), and Doyal and Gough (1991). This study considers the basic needs to include food, water, clothing and shelter only, while recognising the various views expressed by other scholars.

The study acknowledges that income was needed to acquire the basic needs, but further notes that households were keen on what they could derive from the resources they had access to such as the benefits derived from an income, which contributed to their "beings" and "doings" as argued by Sen (1999). Relationships

focused on social aspects of interaction with family, friends (who included business associates, clients and suppliers), and neighbors. Healthy life was highly rated too at 75 per cent while income/wealth followed at 62.5 per cent each. Followed closely were employment and physical security both rated at 50 per cent. Education was rated at 32.5 per cent, 22.5 per cent wisdom and knowledge of God, while 17.5 per cent indicated convenient mobility, and communication.

Convenient mobility and communication is viewed as physical movement and related infrastructure such as good roads, and affordable transport. The researcher observed that there was adequate security within the three clusters promoted through the friendly associations in households. Those who had businesses (shops and food kiosks) targeted people in the same neighbourhood as their customers. From the enabled capabilities to the derived development outcomes, a link can be seen of the role of new technologies in achieving the desired quality of life by the low-income households.

The study postulates that if basic needs are satisfied and households have meaningful relationships enhanced through social inclusion and good health, then income and wealth are just means to households' desired quality of life. The finding confirms Sen's argument that in human development, what matters is what people are capable of being, or doing, with the goods to which they have access. This facilitates them to lead the kind of life they value and have reason to value (Sen, 1999). A follow up question was asked to find out households' perceptions of what role the new technologies played in achieving their desired quality of life in the social, economic and knowledge dimensions of development. The researcher use the data on the mobile phone to demonstrate the findings since as earlier indicated, mobile phones were used for multiple purposes including access to Internet and email(see Table 30).

Table 30: Perceived Role of Mobile Phones in Achieving Desired Quality of Life

	Strongly disagree	Disagree	Neutral	Agrees	Strongly agrees
Economic Perceptions					
Using this technology has increased my household income	20%	10%	5%	7.5%	57.5%
Use of this technology gives my business a competitive edge	10%	2.5%	40%	10%	37.5%
I spend a lot of money due to use of this technology	15%	17.5%	20%	17.5%	30%
I do not waste a lot of money due to use of this technology	15%	5%	15%	12.5%	52.5%
Using this technology has led to job creation	22.5%	0%	5%	22.5%	50%
Using this technology has not led to job losses	15%	25%	35%	15%	10%
I find it expensive to use this technology	20%	15%	32.5%	22.5%	10%
This technology plays a major role in wealth creation	8%	2.5%	15%	27%	47.5%
Social Perceptions					
My relationship with family has improved due to use	0%	0%	5%	32.5%	62.5%
My relationship with friends has improved due to use	0%	0%	5%	35%	60%
My relationship with neighbors has improved due to use	5%	0%	42.5%	12.5%	40%
Using this technology has not brought conflicts in my household	5%	35%	12.5%	27.5%	20%
I can comfortably switch of the technology for a day	32.5%	20%	7.5%	10%	30%
Using this technology makes me feel informed and secure	8 %	2.5%	7.5%	25%	57%
The technology is not an attraction to thieves	28 %	47%	5%	15%	5%
Using this technology makes me feel in control of my time	0%	5%	5%	37.5%	52.5%
Divulging personal details using this technology does not make me feel uncomfortable	28 %	30%	20%	17%	5%
This technology plays a major role in alleviating poverty	8 %	5%	42%	22.5%	22.5%
I spend a lot of time on this technology	28 %	42%	7.5%	7.5%	15%
Knowledge Perceptions					
Use of this technology has led to my improved personal productivity	0%	5%	7.5%	32.5%	55%
Use of this technology makes my work easier	0%	2.5%	0%	32.5%	65%
I have acquired new skills using this technology	0%	5%	2.5%	25%	67.5%
I find this technology convenient to use	0%	2.5%	0%	25%	72.5%

Source: Survey (2010)

The respondents expressed different levels of perceptions of the role of mobile phones in the various aspects of their quality of life. The responses were skewed towards strongly agree, an indication that households perceived mobile phones to be playing a crucial role in achieving their desired quality of life. The study selected some perceptions through combining those who agreed and strongly agreed to understand the overview perceptions starting with economic, social and finally knowledge. A high combined score means that they perceived them as improving their desired quality of life.

Economic

In the economic dimension, wealth and income (62.5%); and employment (50%) are the attributes of quality of life that were highly rated (See Figure 17). Economic status of individuals and households largely dictates the quality of life they have. It influences the choices they make in relation to residential environment, type of technology to have and the usage pattern. The combined responses on perceptions of the role of mobile phones in quality of life that led to economic development are increased income (65%), job creation (72.5%), and enhanced wealth creation (74.5%). As observed, the scores were all above 50 per cent. The study notes that 47.5 per cent of the respondents perceived mobile phones to consume a lot of money. The study however observes that 65 per cent indicated that they did not waste money on the technologies meaning that some of those who spent a large amount were in a productive way according to their own assessment. Only 35 per cent perceived mobile phones to lead to job losses.

Social

In the social dimension, the attributes of quality of life that were highly rated are; basic needs (92.5%), relationships (75%), life and health (healthy life) (75%) and security (50%) (see Figure 17). The combined responses on perceptions of the role of mobile phones in quality of life that led to social development are improved relationships with family (95%), friends (95%), and neighbors (52.5%). As earlier indicated, mobile phones were mainly used to communicate with friends and family members. 82 per cent perceived mobile phones as making them informed and

secure, 90 per cent felt in control of their time due to mobile phone use, 45 per cent perceived them to alleviate poverty (40% were neutral) and 82 per cent did not perceive them as time wasting. Likewise all the scores were 50 per cent except for poverty alleviation where 40 per cent of the respondents were neutral. The perceptions show that the respondents valued the social aspects of the mobile phones.

Knowledge

In the knowledge dimension, the attributes of quality of life that were highly rated are; education (32.5%), and wisdom and knowledge of God (22.5%) (see Figure 17). The combined responses on perceptions of the role of mobile phones in quality of life that led to knowledge development are improved personal productivity at 87.5 per cent; perceived eased work at 87.5 per cent; and skills acquisition at 92.5 per cent. The findings show that while the households perceived the mobile phones to play a role in improving their quality of life in relation to improved productivity, ease of work and skills acquisition, majority of them did not give education much regard as a key attribute of quality of life. This I postulate to be because of their wide usage of mobile phones and by extension Internet regardless of their education level and the benefits from the usage were tangible. The respondents had high perceptions in relation to the role of mobile phones in improved productivity and the convenience they created particularly mobile money services reduction of physical movement.

From the above analysis, the study concludes that the respondents perceived the new technologies to be playing a key role in the social, economic and knowledge dimensions of life, ultimately impacting on their quality of life. Further, their perceived role of the new technologies in improving their quality of life matches with what they perceive to be key attributes of their desired quality of life with the social aspects ranking highly, followed by the economic and finally the knowledge aspects (see Figure 17 and Table 30).

6.7 Relationship Between Derived Development Outcomes and Desired QoL

The study noted a relationship between the listed attributes of quality of life and the development outcomes of using the new technologies. The households' perceptions of what role the mobile phones played in enhancing their desired quality of life show a linkage too. The positive development outcomes led to a high quality of life while the negative development outcomes negated the households' perceptions of a good quality of life.

The study maps the enabled capabilities through the use of the new technologies derived from the data in the social, economic and knowledge dimensions (see section 5.3), the positive development outcomes (see Section 6.3), the households' perceived attributes of good quality of life (see Figure 17), and the perceived role of mobile phones in achieving good quality of life (see Table 30). The positive development outcomes derived from the use of the new technologies enhanced the households' desired attributes of a good quality of life and matches with selected perceived roles of the new technology to good quality of life (see Table 31).

Table 31: Development Outcomes, QoL & Perceived Role of Technology

Dimensions	Capabilities	Positive development outcomes	Perceptions of good quality of life	Perceived role of new technology to good quality of life
Social	• Communication and information access • Social status (social inclusion and exclusion • Privacy and intrusion • Security	• Social connections and inclusion • Enhanced social status and self esteem • Improved security response	• Satisfaction of basic needs • Active and positive relationships • Healthy life • Convenient mobility and communication • Security	• Improves relationships with family, friends and neighbors • Acts as a source of Information on security • Improves time management •
Economic	• Income change • Jobs and employment	• Increased income (improved business) • Employment and job creation	• Wealth and income • Employment	• Increases income • Leads to job creation • Leads to wealth creation

Dimensions	Capabilities	Positive development outcomes	Perceptions of good quality of life	Perceived role of new technology to good quality of life
Knowledge	• Skills and individual productivity • Knowledge accumulation and dissemination	• Informed and knowledgeable households • Improved skills and individual productivity	• Education • Wisdom and knowledge of God	• Improves personal productivity • Eased work • Leads to skills acquisition

6.8 Recap of Findings

The three hypotheses derived from the literature reviewed were tested and confirmed in this part of the thesis. As noted, the study framework had eight enabled capabilities from the use of the new technologies (see Figure 6). The study worked on the premise that individuals are rational beings and maximized on the enabled capabilities to achieve the most valuable development outcomes leading to achievement of their desired quality of life. The eight enabled capabilities through a decision making process that informed choice were converted to twelve development outcomes as discussed in chapter six. The study viewed five of the development outcomes to be negative and seven as positive through a process it acknowledged to be subjective based on the lenses used to interpret the development outcomes. The three hypotheses are recapitulated below.

Hypothesis 1

Usage of new technologies is influenced by demographic factors (age, gender, income, marital status, education, and skills). This hypothesis was tested and confirmed. Skills, gender, marital status, education, age, and income in that order played different magnitude of roles in influencing the usage of the three technologies.

Hypothesis 2

Personal factors, which the study limited to perceptions and preferences influenced the usage of the new technologies independent of demographic factors as, confirmed through tables 14 and 15. Perceptions influenced usage of mobile phones leading to people of the same gender to have different perceptions on whether mobile phones had led to job creation, and whether they had brought conflicts in households as demonstrated in table 14. Preferences influenced usage of mobile phones too, leading to respondents of the same age group, income, and gender to have different preferences in relation to making a call or sending an SMS when available money, urgency and sensitivity of the message were to be taken into account as demonstrated in table 15.

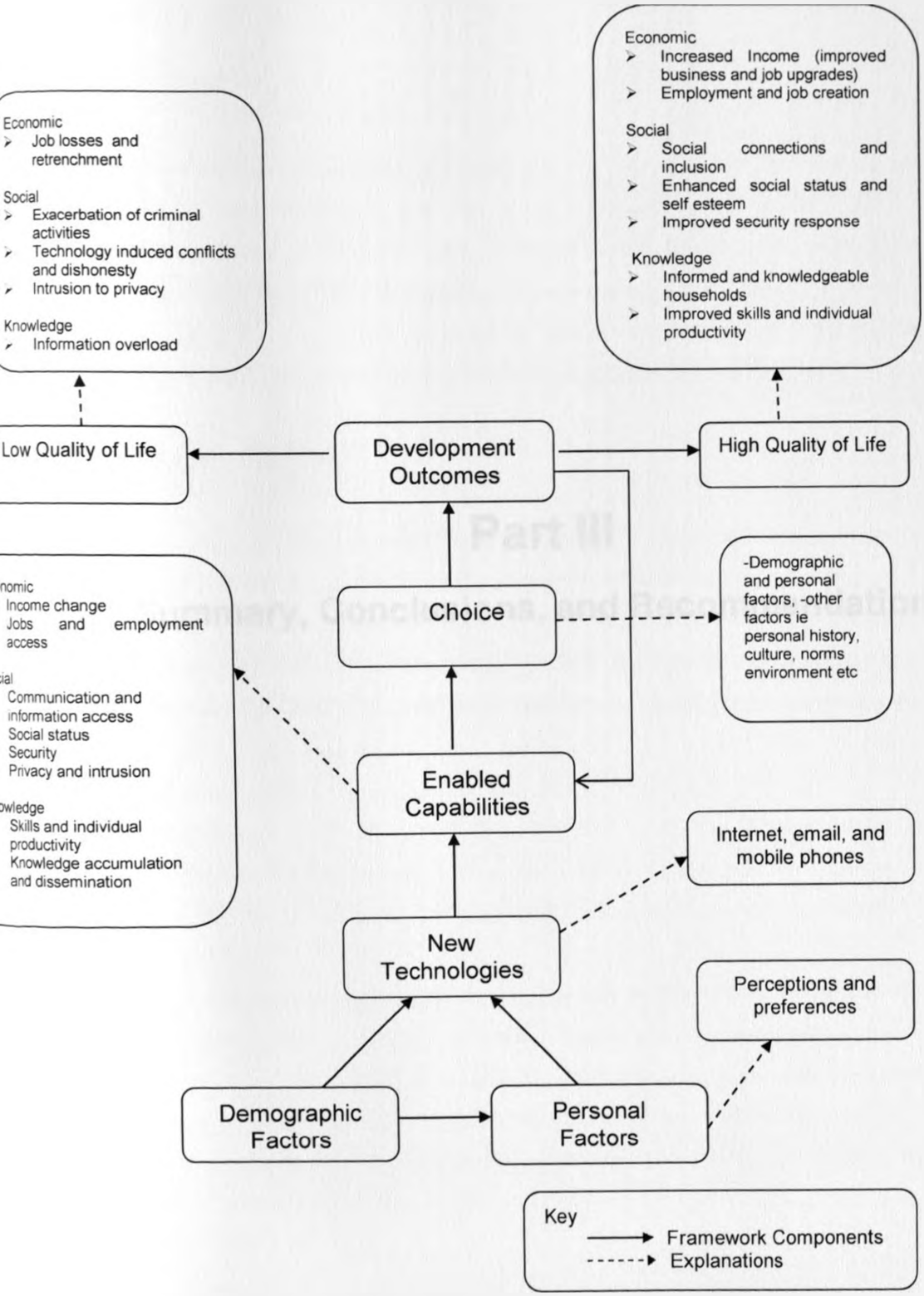
Hypothesis 3

Development outcomes of using new technologies was dictated by choice influenced by demographic factors and personal factors in addition to other factors that were out of scope of this study. The hypothesis was confirmed in section 5.4 and section 6.3.

As noted through the different development outcomes derived, choice dictated the derived development outcomes. The study argued that choice was informed by many factors including the demographic factors and personal factors, which were the focus of this study. Some factors were stronger in influencing some development outcomes than in others as demonstrated by the **B** and **Exp(B)** coefficients of the regression summary table (see Table 28). The study argued that there is a relationship between the derived positive development outcomes and the households' attributes of their desired quality of life (see Table 31).

A summary of the relationship between the aspects discussed in this study, which are; demographic and personal factors, enabled capabilities through the use of the new technologies, the role of choice, the development outcomes derived from usage of the new technologies, and their influence on the attributes of desired quality of life according to the low-income households is demonstrated (see Figure 18).

e 18: Summary of Relationships of Thesis Aspects



Part III

Summary, Conclusions, and Recommendations

Chapter 7

Summary, Conclusions, and Recommendations

7.1 Introduction

This chapter concludes the study by giving an overview of the study, a recap of the study question and objectives, and how they were addressed in the study. The chapter highlights the study contribution towards theory, practice and methodology. Research conclusions and recommendations are given in this chapter in addition to the implication of the study findings to policy, and to the design and implementation of information systems. The chapter ends with suggested further research.

7.2 Research Summary

The study used a rigorous research methodology. Starting with the study problem that outlined the key areas for the study, the study objectives were developed. The literature review was complemented by input from a secondary database, RIA (2007) database from which the enabled capabilities from the use of the new technologies in the social, economic and knowledge dimensions of development were derived. A research conceptual framework was developed and three broad hypotheses formulated which guided the analysis of the data and writing of the thesis. The study process highlighted and discussed the methods used for data collection and analysis. The subheadings used in discussing the study findings were derived from the study objectives, which ensured that they were comprehensively addressed.

The study examined the factors influencing the use of the new technologies in low-income households and broadly classified them as demographic factors and personal factors. It explored the capabilities from the use of the new technologies and summarized them into eight enabled capabilities. The enabled capabilities were subjected to public scrutiny and discussions through the survey (2010) and twelve development outcomes in the social, economic and knowledge dimensions of development emerged.

The study noted that in addition to the demographic and personal factors, other factors that were out of scope of this study informed the choice at the conversion stage ultimately dictating the development outcomes. Of the twelve development outcomes, the study regarded five as negative development outcomes and seven as positive development outcomes, while acknowledging that the classification was subjective based on the lenses used to interpret the outcomes.

The thesis was divided into three parts. The first part consisted of Chapters 1, 2 and 3. The second part consisted of Chapters 4, 5, and 6 while the last part consists of the current chapter, Chapter 7.

The first chapter gave the study background. It detailed the study problems and the objectives. The study scope and expected contribution were discussed with the chapter ending with the definition of key words used in the study. Chapter two discussed the theoretical and empirical foundations. A critical review of literature related to development concepts, quality of life, well-being, Capability Approach, and its applications, and the role of the new technologies in development was carried out. The chapter presented a conceptual framework grounded on the Capability Approach and informed by the work of other scholars. Through the framework, the study illustrated the value of using the Capability Approach or a modified version of it as a useful lens to understand the development outcomes of using the new technologies to the quality of life of low-income households in Kenya, using a case study of Nairobi. Chapter three outlined the study process. The study design, which involved the use of primary and secondary data sources, was given. The chapter detailed the data collection procedure and methods used to analyze the qualitative and quantitative data. The study variables were also defined in this chapter.

Chapter four was the first chapter of part two. The chapter presented the findings, discussions, and specific conclusions. The usage of the new technologies in low-income households and the factors that influence usage were discussed. Chapter five discussed the enabled capabilities from the use of the new technologies including how the capabilities were derived and the role of choice in mediating the conversion process from enabled capabilities to development outcomes. Chapter

six highlighted and discussed the twelve development outcomes that emerged from the eight enabled capabilities through the use of the new technologies. The chapter further discussed the perceptions of quality of life by low-income households and the role the new technologies played in enhancing their desired quality of life in the social, economic and knowledge dimensions. In the chapter, a summary table showing the scope of the role the demographic factors played in influencing the development outcomes was presented. . In addition, a template was presented that scholars could use to predict the likelihood of development outcomes given the six demographic factors. The chapter ended by demonstrating the relationship between all the aspects of the thesis (see Figure 18).

Chapter seven is the only chapter in part three of the thesis. The chapter presents the study summary, and its theoretical, practical and methodological contributions. Overall conclusions and recommendations are given in this chapter highlighting the study implications to policy, and to design and implementation of information systems.

7.2.1 Revisiting the Study Question

The study had a research question that asked, "***To what extent does use of the new technologies enhance the capacity of low-income households in Kenya to achieve their desired quality of life in social, economic and knowledge dimensions of development?"***

The study demonstrated that use of the new technologies by low-income households led to positive and negative development outcomes which ultimately impacted on quality of life. The study acknowledged that classification of whether positive or negative was subjective based on the lenses used to interpret the outcomes. The study further demonstrated that the positive development outcomes led to a desirable quality of life by the low-income households while the negative development outcomes negated the general expectations of a desired quality of life (see Figure 17).

The study argued that quality of life is subjective and different people perceive it differently, largely informed by their past and current circumstances. However, the study noted that there are conspicuous attributes that make a high or low quality of life obvious. The study showed that households used different aspects and features of the new technologies in diverse ways to achieve their desired quality of life. The study demonstrated a relationship between the development outcomes derived from the use of the new technologies with quality of life. The positive development outcomes enhances the households' desired quality of life. The households' perceptions of the role of the new technologies in achieving a desired quality of life correlated with their key attributes of a good quality of life (see Table 31).

The results demonstrate that desired quality of life is a life of choice and not one in which the person is forced into a particular life however rich it might be in other respects. The list of nine key attributes that the households viewed to contribute to a good quality of life confirms this (see Figure 17). The low-income households made choices on the use of the new technologies based on several factors as discussed in chapters 4 and 5. The choices made led to development outcomes, which enhanced or hindered their desired quality of life.

While the new technologies brought out negative development outcomes, which negated the low-income households' perceptions of a good quality of life, the study argued that individuals are rational beings and will work towards improving their quality of life using the new technologies. The results demonstrate that the low-income households used the new technologies to achieve their desired quality of life by their own standards.

7.2.2 Revisiting the Study Objectives

The study started with five research objectives that informed the theoretical and empirical foundations, and the conceptual framework. This section details how the objectives were met.

Objective 1

In the first objective, the study sought "*To assess the factors influencing the use of the new technologies in low-income households in Kenya.*" The study examined the individual factors, classified as demographic and personal factors. The study argued that the use of the new technologies was influenced by demographic factors (age, income, gender, marital status, education, and skills; and personal factors (perceptions and preferences). This was confirmed through hypothesis 1 and 2, tested in chapter four. Usage was influenced by a combination of demographic and personal factors that dictated if the technologies were used and how they were used.

The study demonstrated the role of the demographic factors and personal factors in influencing the usage of the new technologies in transforming the same bundle of opportunities (enabled capabilities) in the social, economic and knowledge dimensions of development to different development outcomes.

The study noted that usage involved the mental process of judging the merits of multiple options and selecting one of them through a decision-making process that led to choice, dictated by the demographic and personal factors. The study acknowledged that there were other factors that informed choice which included individuals' personal history, psychology, social norms, culture and the wider environment, which were out of scope of the study.

Objective 2

In the second objective, the study sought "*To assess the capabilities enabled by the use of the new technologies in the social, economic and knowledge dimensions of development in low-income households in Kenya.*" The study established eight capabilities enabled by the new technologies in low-income households in the social, economic and knowledge dimensions of development. These are:

Social dimension

- Communication and information access
- Social status -social inclusion and exclusion
- Privacy and intrusion

- Security

Economic dimension
- Income change
- Jobs and employment access

Knowledge dimension
- Skills and individual productivity
- Knowledge accumulation and dissemination

This context specific list of enabled capabilities through the use of the new technologies was subjected to public scrutiny through the survey (2010) confirming its acceptability in low-income households, a case study of Nairobi. The study noted that, Kenya is experiencing technology transformation in the mobile phone voice and data services, mobile money services, and the Internet services, broadening the opportunities and capabilities presented through the use of the new technologies.

As Alampay (2006) pointed out, opportunities comprising both achieved and unrealized *Functionings* are evidence in the low-income households.

Objective 3

In the third objective, the study sought "*To establish the development outcomes derived from the enabled capabilities of using the new technologies in the social, economic and knowledge dimensions of development by low-income households, a case of Nairobi*". The research demonstrated that development outcomes of using new technologies in low-income households are a function of many factors. Different combination of factors played dominant roles in determining the specific development outcomes. The study derived twelve development outcomes namely:

- Enhanced skills and individual productivity
- Informed and knowledgeable households
- Information overload
- Increased income
- Employment and job creation
- Job losses and retrenchment

- Social connections and inclusion
- Enhanced social status and self esteem
- Technology induced conflicts and dishonesty
- Enhanced security
- Exacerbation of criminal activities
- Intrusion to privacy

The researcher classified the twelve development outcomes as positive and negative development outcomes (see Section 6.3).

The study argued that the development outcomes of using the new technologies were a function of demographic factors and personal factors, largely informed by other factors that were out of scope of this study. The combination of the factors influenced the ultimate choice of how the enabled capabilities were converted to development outcomes and dictated the derived development outcomes and the ultimate quality of life.

Objective 4

In the fourth objective, the study sought *"To assess the scope of the role the demographic factors played in influencing the development outcomes of using the new technologies in the low-income households."* The study summarized the regression models which showed the extent of the role played by the demographic factors in influencing the development outcomes of using the new technologies in low-income households in Kenya. Some factors played statistically significant roles in determining the development outcomes as demonstrated through the p-values. The signs and values of the **B** coefficients showed the magnitude and direction of the influence while the **Exp(B)** coefficients showed the odds ratio of the valuables in influencing the development outcomes (see Table 28).

A template derived from the findings (see Table 29) could be tested in different low-income households to assess the likelihood of a particular development outcome occurring given the six demographic factors. However, as noted in the study, there

were other factors which influenced choice that must be taken into account when using the table as discussed in section 5.4 and demonstrated through the *Nagelkerke* R^2 values that showed how much of the variance in the regression models was explained by the six independent variables (see Tables 17 to 27).

Objective 5

In the fifth objective, the study sought: "*To highlight the perceptions of low-income households on the role of the new technologies in improving their quality of life in the social, economic and knowledge dimensions.*" The study established that while low-income households' perceived the new technologies to have a positive influence in attaining their desired quality of life, some outcomes did not enhance their desired quality of life. They perceived the new technologies as being able to give them more opportunities to lead valued lives. The demographic factors and personal factors as defined in this study among other factors played a role in influencing choices on the usage of the new technologies, ultimately influencing quality of life (see Figure 18).

The study derived positive and negative development outcomes, while acknowledging that classification is subjective. The positive development outcomes were informed and knowledgeable households, and improved skills and individual productivity in the knowledge dimension; increased income, and employment and job creation in the economic dimensions; social connections and inclusion, enhanced social status and self-esteem, and improved security response in the social dimension. The study linked the positive development outcomes to household's perceptions of a desired good quality of life.

The new technologies enhanced the context specific key attributes of quality of life that the low-income households considered desirable. A good life according to the low-income households had nine main attributes specifically, basic needs met, good relationships, life and health (healthy life), security, wealth and income, employment, education, convenient mobility and communication, and wisdom and knowledge of God (see Figure 17). The negative development outcomes were information overload in the knowledge dimension; job losses and retrenchment in the economic dimension; and exacerbation of criminal activities, technology induced conflicts and

dishonesty, and intrusion to privacy in the social dimension. These outcomes did not positively contribute to the achievement of a desirable quality of life as perceived by the low-income households.

The households' perceptions of the role of the new technologies in achieving their desired quality of life correlated with their key attributes of good quality of life (see Table 31). This is an indication that consciously or otherwise, low-income households use the new technologies to achieve their desired quality of life.

7.2.3 Research Contributions

The study made the following specific contributions.

1. The study developed a context specific list of eight capabilities enabled by the use of the new technologies in the low-income households in a case of Nairobi (see Section 5.3).
2. The study derived twelve development outcomes from the enabled capabilities through the use of the new technologies in low-income households in a case of Nairobi (see Section 6.3).
3. The study derived nine context specific attributes of a desired quality of life as perceived by the low-income households in a case of Nairobi (see Section 6.5).
4. The study came up with a template that future scholars could use to predict the odds of the twelve development outcomes occurring through the use of the new technologies in low-income households given the six demographic factors (see Table 29).
5. The study highlighted households' perceptions of the role of the new technologies in achieving their desired quality of life. It established a relationship between the derived development outcomes of using the new technologies by low-income households with their desired attributes of quality of life (see Section 6.6 and Figure 18).

The contributions are detailed below broadly classified as theoretical, methodological, and practical contributions.

Theoretical Contribution

The study used the Capability Approach to demonstrate how the new technologies, which are means to achievement, enhance and expand the capabilities of low-income households to derive different development outcomes. From the reviewed literature, the study developed a conceptual framework that guided the study (see Figure 6).

The study makes contribution to current thinking considering that innovation and knowledge are the current drivers of the global economy. The new technologies are envisioned to transform lives globally hence the importance of understanding the low-income households and how they view the technologies in relation to enhancing their quality of life. According to KNBS (2009), 46 per cent of Kenyans are regarded as poor while 72.12 per cent of Nairobi households are regarded as low-income households. Given the huge population of the poor, it is important to adopt a broad, systematic inquiry into life values as perceived by the low-income households. As noted by Arku (2008), a number of quality of life investigations are made from an economic and materialistic perspective ignoring other aspects of life. This study demonstrates that low-income households value social and psychological needs in addition to the economic and materialistic needs.

The researcher had noted that the interrelationship between the factors that influence the usage of the new technologies is not clearly established. Further, the significant role played by the demographic and personal factors (preferences and perceptions) as defined in this study and other factors that influence choice have not been given much attention considering that they have a huge influence on the ultimate development outcomes as demonstrated in the study. Usage expands choices, adding to people's capability to participate in the potential benefits that the information society presents. The results from this study will hopefully provoke further research on these factors.

The study developed a template for scholars to predict the odds of the twelve derived development outcomes occurring given the values of demographic factors while noting that there are other factors that influence the choices made and the

ultimate development outcomes derived in low-income households (see Table 29). The template is relevant to researchers intending to interrogate more the twelve development outcomes. The nine attributes of quality of life are also context specific and could be interrogated further by other researchers.

Preliminary findings from the study were presented in a regional conference in April 2010 in Cape Town. The paper was peer reviewed and published by Info Journal (Ndung'u and Waema, 2011). Another paper was derived from the study, peer reviewed and presented in a regional conference held in April 2011, in Nairobi. The paper has been accepted for the next Info journal series. Further, the researcher was invited to present her work as a poster at the Human Development and Capability Association (HDCA) conference held in September 2011, at The Hague where she discussed her work with scholars in the area including Amartya Sen, Martha Nussbaum, Ingrid Robyens and Sabina Alkire.

Practical Contribution

The findings of this study will change how the new technologies are viewed in relation to development outcomes in the low-income households. The study demonstrated that the development outcomes of using the new technologies were not only limited to monetary values, but also to psycho-social outcomes such as enhanced social status and self-esteem which cannot be quantified in monetary terms. The study showed that despite the fact that the new technologies brought massive benefits to households leading to a high quality of life, they have been a source of ruin in some cases. Households used the technologies to perfect their activities some of which were criminal related. The study established that demographic factors and personal factors, in addition to other factors such as psychology, personal traits, and the wider environmental conditions informed choice that mediated the conversion process of the capabilities to development outcomes. Different development outcomes led to varied levels of quality of life (see Figure 18).

The study affirmed the role of education and skills in utilising the capabilities enabled by the new technologies to achieve development outcomes that leads to a high and desirable quality of life. Education and skills played statistically significant roles in

five of the seven positive development outcomes. It demonstrated that the key to harnessing the new technologies to impact positively on quality of life is skill development. The study demonstrated the inequity in education achievements across gender and the influence the inequity had in utilising the potential benefits presented through the new technologies. These findings will inform the development practitioners and the government to put more effort in training, targeting the low-income households while addressing the current gender imbalance in relation to education, equalizing the opportunities presented by the new technologies.

Finally, the study revealed the subjective nature of quality of life, demonstrating that opportunities need to be evaluated in terms of real and existing aspects of life as it is lived and not in theoretical terms. It argued that low-income households use the new technologies to derive different outcomes based on their perception of good life and what they value. The findings will enable the government and other development practitioners to map their priorities in development with evidence and an understanding of how the low-income households view the role of the new technologies in enhancing their quality of life.

Methodological Contribution

The study used primary and secondary data sources. From an existing secondary database, (RIA 2007 database) which the researcher was involved in, a list of eight enabled capabilities through the use of the new technologies were derived. The relevant variables were analysed to understand the usage of the new technologies and to derive the capabilities. Due to the wide coverage of the secondary database, the study examined the enabled capabilities from a wider perspective and different environmental conditions enriching the study.

The output from the secondary database complemented by the theoretical and empirical foundations informed the development of the survey (2010) tool that went deeper in subjecting the eight enabled capabilities to public scrutiny and discussions. Twelve development outcomes and nine attributes of quality of life were derived from the analysis of the survey (2010) data. This demonstrates that secondary databases that are relevant to a research area could be used to ground and inform a research.

7.3 Research Conclusions

The research draws the following conclusions.

Conclusion 1

Capability Approach is a useful framework for studying the effects of ICT on quality of life at the micro-level (individuals and households).

Use of Capability Approach as the theoretical framework for this study helped in evaluating what low-income households are able to do and be from opportunities presented through the use of the new technologies. The research confirmed Sen's assertions that access and usage of the new technologies does not necessarily lead to development unless other entitlements are provided. Sen's holistic approach to development is well suited to evaluate the potential effects of interventions using the new technologies considering that technologies are introduced into an existing and already complex web of mutual causality.

Sens' Framework proved useful in studying the effects of ICTs on quality of life at the micro-level (individuals and households). Other scholars have applied the capability approach in the broad field of information systems such as Gigler (2004), Kauffman & Kumar (2005), Kleine (2009), Zheng and Walsham (2007), and Alampay (2006) and found it useful as discussed in chapter 2.

As Sen (1992) notes, equality in social arrangements should be in the space of capabilities. People should be enabled to enjoy equal capability sets since the choices they make are likely to derive different development outcomes leading to different levels of quality of life. Capability Approach is about expanding peoples' capabilities to lead the kind of life they value and have reasons to value.

Conclusion 2

Education, skills and gender plays a key role in the productive usage of the new technologies.

The study shows that education significantly influenced on whether the new technologies were used for development outcomes that led to a high quality of life. This included the following; usage for information and knowledge access across the income levels (see Table 17), enhancement of skills and individual productivity (see Table 18), usage for access to job opportunities (see Table 20), and usage that led to increased income (see Table 21). Further, education had statistically significant influence on the usage of the Internet and email across the income groups, and on mobile phones for the respondents with income of Kshs. 23,671 and below (see Table 10).

The study noted that with innovations such as M-PESA the respondents who used the technology and were confident with the usage cut across education levels. The study notes that the respondents in the survey (2010) were using M-PESA regardless of their education level. Respondents with little education could pay for services using mobile money, an indication that an innovation like M-PESA can change the arguments about the role of education in the usage of the new technologies. They acquired the skills to use because of the expected benefits they believed would be derive from the usage.

Olatokun (2009) in his findings stated that males used various types of ICT more than females. He further indicated that males were more educated than the females. The findings from this study show that males were using the new technologies more than the females (see Table 12). They further show that males had acquired more years of education than the females (see Table 13). Education increased the chances of having skills on usage of the new technologies. This demonstrates that if equal education opportunities were available for all, then the usage differences could be addressed across the gender. The inequality in education and skills level across gender in low-income households were seen through the usage.

Conclusion 3

Use of the new technologies in low-income households leads to positive and negative development outcomes.

The study demonstrated that people with identical capability sets are likely to end up with different types and levels of development outcomes, as they make different choices following their different ideas of good life. Some people used the new technologies to increase their income and to access job opportunities while others lost job opportunities due to use of the same technologies. This impacted on their household social-economic status.

The social, economic and knowledge situations households found themselves in, affected their freedom of choice. Their freedom, in turn, was a factor in their ability to make use of the new technologies leading to diverse development outcomes. The emergence of positive and negative development outcomes confirms Sens' (1999) assertions that increase in choices through varied means to achievement do not necessarily lead to an increase in freedom, because the freedom added may not necessarily be the one valued and in addition, the option to live a peaceful and unbothered life may be lost. The study established that some development outcomes, such as enjoying social status and self-esteem were based on perceptions and were preference dependent. Some households valued social status and respect from their peers hence had expensive mobile phones.

Conclusion 4

Choice influence the ultimate decision made and dictates the development outcomes derived from the use of the new technologies.

Households' heads made choices on whether to use the new technologies and how to use then based on varied combinations of demographic and personal factors in addition to other factors. As noted by Ramirez (2007), one cannot single out one factor as there are many that contribute to a specific development outcome. To ensure maximum benefits from development projects using the new technologies as the platform, the factors that influence choice at the usage level and at the level of converting the enabled capabilities to development outcomes should be taken into account holistically.

The study showed that choices are arrived at through decision-making processes that are influenced by the demographic, personal and other factors out of scope of this study. The influence of these factors was shown in section 5.4. Clark (2003) established that people valued aspects of their life such as access to an income or healthcare as much as they valued a good family and relationships. These influence the choices they make in relation to use of the new technologies.

Conclusion 5

Development outcomes lead to a high quality of life or low quality of life.

The study has demonstrated that the new technologies enable capabilities that are converted to development outcomes ultimately influencing the low-income households' quality of life in different ways. The study noted that the new technologies are not just about connectivity but also about the capability of people to acquire and use the tools and content in ways that improve their lives. Those who lacked these prerequisites capabilities were excluded from the potential benefits. This was demonstrated through the diverse development outcomes that were derived from the enabled capabilities, affecting quality of life differently.

As noted by some authors, new technologies could exacerbate the gap between the rich and the poor and widen the income gap (Torero and Braun 2006). Robeyns and Van der Veen (2007) pointed out that policymakers are mandated to provide real options for quality of life even though they cannot decide how people live their lives. For instance, Soriano (2007) found that making information available in low-income households did not make the poor to use the information to improve their livelihoods. Other authors have argued that the outcome of ICT usage is influenced by the context (Tiwari, 2008). The study established that education and skills played a key role in productive use of the new technologies to enhance households' desired quality of life that translated to high quality of life.

7.4 Usefulness of CA in Evaluating Effects of New Technologies

The study demonstrated the effectiveness of Capability Approach in evaluating the development outcomes of new technologies to the quality of life of low-income households. The findings showed that low-income households valued goods and services that they viewed to offer them benefits despite the monetary tag attached to them as in the case of all the respondents in the survey (2010) using mobile phones despite the low-income levels and in the case of using mobile phone M-PESA feature despite varied education levels and age differences.

The Capability Approach addresses genuine choices with substantial options with the capability set judged in terms of the quality as well as the quantity of available opportunities. The Capability Approach further emphasizes on the importance of responsible choice, indicating that it might be better to concentrate on *achieved functionings* if intelligent choice is complicated by uncertainty or social conditioning limits the options. Sen notes that some capabilities may involve huge opportunity costs and offers a solution that it may be better to separate freedom of choice, and to look at poverty and deprivation in terms of observable achievements (Sen, 1992).

The findings demonstrated the viability of using the Capability Approach in measuring the development outcomes of the new technologies to the quality of life of low-income households. The findings demonstrate that there are many factors that influence if the new technologies are used, how they are used and the derived outcomes. The study demonstrated that access to the new technologies do not automatically translate to usage and likewise usage does not result to uniform development outcomes even for those who are of the same age and gender. This shows that there is a need for a paradigm shift in the current approach to poverty alleviation and adopt a holistic approach in implementing and reviewing projects targeting low-income households using new technologies as the means.

Sen's generic framework offers this paradigm shift due to its focus on the individual and what they are able to do and be with the resources they have. Its flexibility allows it to be customized and contextualized to particular projects while considering the influence of mediating factors, which includes demographic and personal factors

iscussed in this thesis in addition to other factors which ranges from person's sychology, mental condition, culture, social norms, occupation, and the wider environmental conditions.

As Sen has articulated, if one uses capability expansion as the basis of ethical evaluation, then the information that would need to be gathered in order to evaluate progress changes significantly, and the principles by which information would be assembled aggregated and analysed would also expand (Sen 1985).

This study will form a basis for other researchers to use the Capability Approach in evaluating development outcomes of projects using the new technologies in low-income households bringing a different perspective and focus to other outcomes that are not material or monetary related while considering the influence of mediating factors.

7.5 Implications for Information Systems Design and Development

The findings reveals that an integrated approach that not only look at access and usage, but also the capabilities of people to derive meaningful outcomes from usage of the new technologies should be used in the design of information systems. Information systems targeting the low-income households should place emphasis on desirable development outcomes and influence of mediating factors which ranges from demographic, personal, social, cultural and environmental factors.

Active participation of beneficiaries of the information systems aimed at addressing poverty is imperative from design to the implementation. The information systems should be localized and contextualized to address local challenges in ways determined by the intended beneficiaries. As noted, access to ICT does not translate to usage and further usage does not necessary lead to desirable development outcomes or enhancement of desirable attributes of quality of life.

When designing information systems, positive and negative outcomes should be envisioned and measures put in place to minimize the effect of the negative

outcomes and maximize on the positive outcomes. Sen has argued that negative freedom has intrinsic as well as instrumental significance (Sen, 1985). Moderating factors that were not evaluated in this study should be looked into in evaluating the outcomes of information systems aimed at addressing poverty.

7.6 Policy Implications Emanating from the Research.

The research has the following policy implications.

The first implication is that ***concerted effort should be made by the government, development actors and practitioners including the civil society, and individual users of the new technologies to ensure productive utilization of the new technologies by the low-income households with a view to enhance their quality life.***

In addition to policies looking at ways of providing access, they should consider the points that Sen raises in his theory about the differences among people in the ways they value and transform the same bundle of goods and the goals they have for using them. Vision 2030 which aims at making Kenya an industrialized nation by 2030 should lay more emphasis on enhancing people's capabilities and expansion of their freedom and choices to lead lives they value and have reasons to value. As noted from the findings, people's perceptions of a good life is subjective and conditions should be enabling for them to pursue livelihoods that will enhance their perceived good life.

This would include re-evaluating the current ways of looking at development and the factors that influence it. Consequently, development through the use of the new technologies should be evaluated objectively. As noted from the research findings, the new technologies have the potential to fundamentally enhance the quality of life of low-income households. With bundled services such as mobile money and Internet services, which are increasingly becoming cheaper and available in all parts of the country, the low-income households should be enabled to make rational choices in relation to how they use the new technologies to achieve their desired quality of life.

Accordingly, there is a need to look at the ability to adopt and use the new technologies within the existing socio-economic environment of the livelihoods of the low-income households. This would minimize the negative development outcomes and maximize on the positive development outcomes leading to a high and desired quality of life by the low-income households.

The second policy implication is that ***for the new technologies to fast track the development process in low-income households, the capabilities of the households should be enhanced through training and skills development for maximum utilization of the potential benefits of the technologies.***

The social pillar of Vision 2030 emphasizes on investing in the people of Kenya in order to improve the quality of life for all by targeting a cross-section of human and social welfare projects and programmes. It specifically mentions education and training; health; environment; housing and urbanisation; gender, children and social development; youth and sports; and labour and employment. Further, the vision recognizes the overarching role of Science, Technology and Innovation, and the need for enablers and macro foundations that includes deploying world class infrastructure facilities and services in order to drive, influence and effect the economic, social and political development.

While the researcher acknowledges that some projects are underway that supports vision 2030 such as the digital villages expected to spread across the country, training and skills development should be targeted to the low-income households given that they constitute 72.12% of Nairobi population (see Table 1) and 46 per cent of the Kenyan population are below poverty line (KNBS. 2009)

Education and skills play a crucial role in productive utilization of the new technologies as revealed from the study. Education inequalities across gender in low-income households were manifested in the usage of the new technologies and related development outcomes. As the new technologies continue evolving and being integrated in the daily activities by households across social-economic divide, expectations that they would solve a variety of development challenges should not ignore the power relations and social structures that contribute to inequities.

he third policy implication is that ***guidelines and policies are needed to address he emerging issues related to the use of the new technologies considering he rapid growth in their usage and the diverse development outcome derived rom the usage.***

The new technologies, particularly the mobile phones, contribute to social capital by providing a means for people to become active citizens by engaging in small acts of social responsibility and interpersonal concern. The findings demonstrated that there are benefits to be derived by low-income households from the use of the new technologies; and that there are several factors that dictate the derived development outcomes. The study showed the conversion process from enabled capabilities to development outcomes. Choice mediated the conversion process, which was informed by the demographic factors, personal factors and other factors. In practice, this is vital for policy makers as it emphasizes a range of possibilities, revealing the gap between what is perceived as important and what is actually achieved. This could influence policy on service provision in the low-income households to enhance their desired quality of life.

The respondents made calls promptly to alert others of potential dangers. This led to fast mobilization of response teams in cases of emergency. The potential should be exploited to ensure maximum benefits of the calls, bearing in mind that in some cases, they could affect emergency institutions negatively as they cause information overload and confusion especially when there are many callers reporting the same incident, which may lead to delay in response and prevention of other emergency calls from going through. It would be helpful if users are given guidelines in case of such situations.

Further, policies needs to be put in place that ensure rational choices are made on how to engage with others using the new technologies with less interruption to those around. Public use of mobile phones sometimes spread tension to all those within earshot, while leaving them powerless to intervene. In addition, it is becoming less viable to measure individual work inputs by simply verifying the time of physical presence since new technologies interrupts formal engagements any time. The

government and employers would need to come up with different measures of productivity while ensuring respect for employees' privacy and free time.

7.7 Suggested Further Research

1. The study suggests further research that would use as the starting point the:

- Eight enabled capabilities from the use of the new technologies,
- Twelve derived development outcomes
- Nine attributes of quality of life
- Template derived from the study

The suggested study would interrogate the eight enabled capabilities discussed in Chapter 5 and the derived development outcomes discussed in Chapter 6 in a different set of population. In addition, research could use the template from the study (see Table 31) to predict the likelihood of the development outcomes given the variables of the six demographic factors in different groups of population. The study acknowledges that the new technologies are evolving rapidly with new development outcomes emerging.

2. This study focused on six demographic factors namely age, income, gender, marital status, education level and skills; and personal factors namely perceptions and preferences while acknowledging that there was influence from other moderating factors. A study should assess the role of the other moderating factors such as personal history, psychology, social norms, culture, and the wider environment on the conversion of ICT enabled capabilities into development outcomes. The study could be in the form of an ethnography.

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Appendix 1: Survey (2010) Questionnaire

(The head of the household or a responsible adult to answer).

Cluster Number/Name _____ KNBS HH Nos. ___
Questionnaire unique number _____
Mobile contacts_____ Email contacts _____

Section A: Household Information *(Inform 3a and 3b of framework)*

1. Name of the respondent (Optional) _____
2. Gender

   Male ☐ Female ☐

3. What year were you born?

   19___

4. What is your marital status?

   Single ☐ Married ☐ Widowed ☐
   Separated ☐ Divorced ☐

5. What is your highest level of education? (Indicate number of Years)

   Pre-primary ☐ Primary certificate ☐ Secondary certificate ☐
   University /Tertiary ☐

6. Do you have any further training?
   Yes ☐ No ☐

7. If yes, to (6) please specify the course and duration of training.

	Course/training	Week(s)	Month(s)
1.			
2.			
3.			

8. Are you engaged in any income earning economic activities?

   Yes ☐ No ☐

9. If yes to (8), is it within the formal or informal economy
   Formal ☐ Informal ☐

   Specify Formal_____
   Specify Informal_____

10. If no to (8), what do you do?

    Full time Student ☐ Volunteer (Intern) ☐ Unemployed ☐
    Pensioner ☐ Others (specify) _____

Section B: Skills in new technologies *(Vifaa vya mawasiliano vya kisasa)*

11. Please list all household members:

	Name (optional)	Age	Occupation	Use email?	Use Internet?	Use Mobile?	Who pays for usage?
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

12. Do you have skills on using Internet?
Yes ☐ No ☐

13. How did you get the skills?
Formal training` ☐ Informal (friends, relatives, neighbors) ☐
Trial and error ☐ Others, Specify _____

14. Do you have skills on using mobile phones?
Yes ☐ No ☐

15. How did you get the skills?
Reading manuals ☐ Trial and error ☐
Friends, relative ☐ Others, Specify _____

Section C: Internet and mobile phones usage
Assess the usage of Internet and mobile phones at the households' level and factors influencing the usage. *(1, 3a, 3b and 4 of the framework)*

16. Where do you access the Internet from?

Internet access	Workplace	Yes ☐ No ☐
	Cybercafe	Yes ☐ No ☐
	Broadband at home	Yes ☐ No ☐
	Via mobile phone	Yes ☐ No ☐
	Others, Specify_____	

17. Please respond to the following statements with an yes or no

Situation	Internet	Mobile phones
I can confidently use this technology	Yes ☐ No ☐	Yes ☐ No ☐
I can easily make and receive calls (VOIP)	Yes ☐ No ☐	Yes ☐ No ☐
I can easily send and receive SMSes	Yes ☐ No ☐	Yes ☐ No ☐
I can easily send and receive an email	Yes ☐ No ☐	Yes ☐ No ☐
I can use instant messaging /chat with ease (I)	Yes ☐ No ☐	Yes ☐ No ☐

Situation	Internet	Mobile phones
can use MPESA/ZAP etc with ease (M)	Yes ☐ No ☐	Yes ☐ No ☐
can pay my bills with ease	Yes ☐ No ☐	Yes ☐ No ☐
can participate in an online discussion (I)	Yes ☐ No ☐	Yes ☐ No ☐
can use search engines with ease (I)	Yes ☐ No ☐	Yes ☐ No ☐

18. Features and services of Internet and mobile phones used

Use aspects	Internet	Mobile phones
What features of this technology do you use?	Chat rooms ☐ E-learning sites ☐ Ecommerce sites *(Biashara kwa mtandao)* ☐ *Facebook, linkedIn* ☐ **Others**	Radio ☐ Camera/video ☐ Calendar ☐ Clock ☐ Calculator ☐ Games ☐ MP3 music player ☐ Recorder ☐ Internet access ☐ **Others**

19. I make choices on the use of this technology based on the following? Leave blank if not applicable

Dimensions	Influencers	Internet[7]	Mobile phones[8]
Economic	The amount of money I have on my phone determines whether I make a call or send an SMS (M)	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The amount of money I have determines how long I spend on the Internet.	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The urgency of message to be communicated determines whether to make a call or SMS (M)	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The urgency of message to be communicated determines whether send an email or chat	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The location of the recipient determines if I make a call, send an SMS or send an email	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
Social	My relationship with a person determines whether I call or send an SMS	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	My relationship with a person determines whether I send the an email or chat	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The time of the day/night determines whether I call or send an SMS	Yes ☐ No ☐	Yes ☐ No ☐

[7] Send email or chat platforms
[8] Send SMS or call

	Please explain		
	The time of the day/night determines whether I send an email or chat	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The sensitivity of the information to be communicated determine whether I call , send an SMS or email	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
Knowledge (*Maarifa*)	My typing skills determines whether I call or send an SMS	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	My typing skills determines whether I email or chat	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The capabilities of the recipient determines whether I call or send an SMS	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		
	The capabilities of the recipient determines whether I email or chat	Yes ☐ No ☐	Yes ☐ No ☐
	Please explain		

Section D: Development outcomes *(Matokeo kimaendeleo)* **of Internet and mobile phone usage (Link and map the development outcomes of usage of Internet and mobile phones to households' quality of life in social, economic and knowledge dimensions).**

20. Please respond to the following statements on the use of Internet and mobile phones (Leave blank if "do not know" or "not applicable")

Dimension	Attributes	Ways of use	Internet services	If yes, how frequent	Mobile phone services	If yes, how frequent
Economic	Income	Do you use the service for income generating activities	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Does use of the service strengthen your relationship with clients	Yes ☐ No ☐		Yes ☐ No ☐	
		Does use of the service strengthen your relationship with suppliers	Yes ☐ No ☐		Yes ☐ No ☐	
		Does use of the service save you money	Yes ☐ No ☐		Yes ☐ No ☐	
		Does use of the service make you spend more money?	Yes ☐ No ☐		Yes ☐ No ☐	
	Employment and Job creation	Do you use the service to access job opportunities	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Do you use the service to contact your employees	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Do you use the service to contact your employer	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
	How else do you use the technology for economic activities					
	1			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
	2			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
	3			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
Social	Communication	Do you use the service to communicate with family	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Do you use the service to communicate with friends	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Do you use the service to communicate with neighbours	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
	Information access	Do you use the service to access news and information	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
	Security	Does the technology enhance your security status	Yes ☐ No ☐		Yes ☐ No ☐	

Dimension	Attributes	Ways of use	Internet services	If yes, how frequent	Mobile phone services	If yes, how frequent
		Does the technology threaten your security status	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you used the technology in an emergency?	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you used the technology to avert a security mishap *(Kuzuia ajali na mikasa)*	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you used the service to transfer money?	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Have you lost money through the service?	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you been robbed of a phone or Internet accessories	Yes ☐ No ☐		Yes ☐ No ☐	
		Do you use the service as a form of storage of money (M)	Yes ☐ No ☐		Yes ☐ No ☐	
		Do you use the service as a form of storage of documents (I)	Yes ☐ No ☐		Yes ☐ No ☐	
		Are you aware of scams through technology	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you been a victim of a scam	Yes ☐ No ☐		Yes ☐ No ☐	
	Social Status	Does use of the technology enhance your sense of style	Yes ☐ No ☐		Yes ☐ No ☐	
		Do you feel respected by your peers because of the type of the technology you use	Yes ☐ No ☐		Yes ☐ No ☐	
		Does use of the technolgy strengthen your relationship with friends	Yes ☐ No ☐		Yes ☐ No ☐	
		Does use of the service strengthen your relationship with family	Yes ☐ No ☐		Yes ☐ No ☐	

Dimension	Attributes	Ways of use	Internet services	If yes, how frequent	Mobile phone services	If yes, how frequent
		Does use of the technology make you feel included in the various social groups	Yes ☐ No ☐		Yes ☐ No ☐	
	Privacy and Intrusion *(Kuingilia mambo ya kindani)*	Have you used online networking tools such as facebook, linkedIn (I)	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Has any member of household invaded your privacy through the technology	Yes ☐ No ☐		Yes ☐ No ☐	
		Do you use the technology to monitor and control your employees	Yes ☐ No ☐		Yes ☐ No ☐	
		Does your employer use the technology to monitor and control you.	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you uploaded your pictures and information in a website (I)	Yes ☐ No ☐		Yes ☐ No ☐	
		Has your privacy ever been intruded using the technology	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you ever felt violated though the technology	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you ever found information relating to you circulating through the technology without your knowledge	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you used the technology to circulate someone else's information without their knowledge	Yes ☐ No ☐		Yes ☐ No ☐	
	How else do you use the technology for social activities					
	1			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
	2			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐

Dimension	Attributes	Ways of use	Internet services	If yes, how frequent	Mobile phone services	If yes, how frequent
	3			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
Knowledge	Skills and individual productivity *(Mazao mengi ya*	Has the use of technology improved your skills	Yes ☐ No ☐		Yes ☐ No ☐	
		Have you enrolled in any of the e-learning courses using the technology? (I)	Yes ☐ No ☐		Yes ☐ No ☐	
	Knowledge accumulation and dissemination *(Mkusanyiko wa maarifa)*	Does technology offer you access to local knowledge (social, economic, agricultural political culture etc)	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Do you get information overload through the technology	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
		Have you used the technology to disseminate information and experience	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐	Yes ☐ No ☐	Daily ☐ weekly☐ Monthly ☐
	How else do you use the technologies for knowledge activities					
	1			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
	2			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐
	3			Daily ☐ weekly☐ Monthly ☐		Daily ☐ weekly☐ Monthly ☐

Section E: Perceptions of Internet and mobile phone role in achieving desired QoL (Document people's perceptions of the role of the Internet and mobile phones in improving their quality of life).

21. Please respond to the following statements in a scale of 1 to 5. Where ***(1-Strongly disagree 2-Disagree, 3- Neutral, 4 – Agree, 5 – Strongly agree)***

	Situation	Internet					Mobile phones				
		1	2	3	4	5	1	2	3	4	5
For those not using technolog at all	I have no interest in using this technology										
	I choose not to use this technology										
	I cannot afford to use this technology										
	I have no time to use this technology										
	I have no skills to use this technology										
Economic	Using this technology has increased my household income										
	Use of this technology gives my business a competitive edge *(Kunufaisha kibiashara)*										
	I spend a lot of money due to use of this technology										
	I waste a lot of money due to use of this technology										
	Using this technology has led to job creation										
	Using this technology has led to job losses										
	I find it expensive to use this technology										
	This technology plays a major role in wealth creation *(Kutengeneza mali)*										
Social	My relationship with family has improved due to use of this technology										
	My relationship with friends has improved due to use of this technology										
	My relationship with neighbours has improved due to use of this technology										
	Using this technology has brought conflicts in my household										
	I can comfortably switch of the technology for a day										
	Using this technology makes me feel informed and secure										
	The technology is an attraction to thieves										
	Using this technology makes me feel in control of my time										
	Divulging personal details when using this technology makes me feel uncomfortable										
	This technology plays a major role in alleviating poverty (Kupunguza umaskini)										
	Using this technology has interfered with the environment										
	I spend a lot of time on this technology										
	I waste a lot of time on this technology										
Knowledg	Use of this technology has led to my improved personal										

	Situation	Internet					Mobile phones				
e	productivity										
	Use of this technology makes my work easier										
	I have acquired new skills using this technology										
	I did a course through the technology										
	I would consider enrolling in an e-learning course										
	I find this technology convenient to use										
Others	The service is available all the time when I need it										
	The service is accessible everywhere I need it										
	I receive assistance from the providers when using the service										

22. In your view what are the six things that constitutes a good quality of life *(Kipimo cha maisha bora)*?

a. _____ b. _____
c. _____ d. _____
e. _____ f. _____

23. In what ways has Internet usage affected/impacted your **households'** quality of life economically?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

24. In what ways has Internet usage affected/impacted your **households'** quality of life socially?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

25. In what ways has Internet usage affected/impacted your **households'** quality of life in relation to knowledge?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

26. In what ways has mobile phones usage affected/impacted your **households'** quality of life economically?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

27. In what ways has mobile phones usage affected/impacted your **households'** quality of life socially?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

28. In what ways has mobile phones usage affected/impacted your **households'** quality of life in relation to knowledge?

Positive impact a): _____b):_____c): _____

Negative impact a): _____b):_____ c): _____

Section F: Household expenses

29. On average, how much does your household spend on the following?

			Items	weekly	Monthly	Who pays
1	Food items	Staple food	Rice, flour, sugar & cooking fat			
		Fruits and Vegetables	Fruits, onions, tomatoes etc			
		Soft drinks	soda/juice, milk, porridge			
		Animal products	Meat/Fish /Eggs/sausages			
2		Utilities	Rent/rates/mortgage			
			Electricity			
			Water			
			Garbage collection			
		Energy	Kerosene/Charcoal			
			Cooking gas			
		Transport	Private means			
			Public means			
			Others eg upcountry, and school visits			
4	Communication	e-Communication	Internet access Cybercafé			
			Internet access-mobile			
			Cell phone airtime			
			Others			
5	Personal care	Personal care	Hair maintenance, hygiene, cleaning detergents			
			Clothes and shoes			
6	Enterta		Cigarettes/tobacco			

			Items	**weekly**	**Monthly**	**Who pays**
	inment	Entertainment & luxury	Beer/ wine/local brew Music/plays/DVDs			
7	Holiday	Transport, food and accommodation				
8	Health		NHIF, clinic etc			
9	Insurance	Personal/car	personal Car			
10	House help					
11	Others					
				Per term	Per year	
3	Education		School fees, tuition and feeding program College/university fees School uniform Transport to school			

30. What is your total monthly household income? (All working household members)

	Monthly income (salary/ wages)	Monthly income (self-employment/business)	Monthly income (Other sources, specify_____
Respondent			
Spouse			
Other household members and relationship to head of the household			

Appendix 2: RIA (2007) Questionnaire -e-Access & Usage

(Data collected using a Personal Digital Assistant (PDA) hence the format and coding)

1. COUNTRY NAME - [Kenya]

2. SURVEY LOCATION - [a.2]

    1. [_] - [1] Major Urban
    2. [_] - [2] Other Urban
    3. [_] - [3] Rural

1. Please list all household members: - [HHmember]

Household attributes & appliances ----------

1. How much does the household spend on bills in a month? (Rent, water, electricity, food, school fees etc: estimate in local currency, numbers only) - [w.1]

    _____

    4. [_] - [4] Yes, at work place
    5. [_] - [5] Street address
    6. [_] - [6] Local shop/school
    7. [_] - [7] other

2. Does anybody in this household have the ability to use a bank account? - [w.5]

    1. [_] - [1] yes, at least one household member has a own bank account
    2. [_] - [2] yes, through work
    3. [_] - [3] yes, through someone else
    4. [_] - [4] no

    (Select only 1 - ONE!)

3. Does this household have a working Internet connection? - [w.6]

    1. [_] - [1] yes
    2. [_] - [2] no

4. What type of internet connection is this - [w.7]

    1. [_] - [1] modem dial-up
    2. [_] - [2] ISDN dial-up
    3. [_] - [3] ADSL
    4. [_] - [4] Leased Line
    5. [_] - [5] wireless
    6. [_] - [6] using mobile phone

7. [_] - [7] other

(Select only 1 - ONE!)

5. Could you tell me how much is spend monthly for the INTERNET (subscription and use)? - [w.8]

_____

6. Do you ever let anybody outside the household use the INTERNET at your home? - [w.9]

1. [_] - [1] Yes
2. [_] - [2] No

7. How frequently is this Internet used for work/income generating activities - [w.12]

1. [_] - [1] Never
2. [_] - [2] Seldom
3. [_] - [3] Frequently
4. [_] - [4] Always

8. Is the current cost of calls to mobile phones during peak time? - [h.12]

1. [_] - [1] low
2. [_] - [2] ok
3. [_] - [3] too high

receiving money2 ----------

1. Does anyone send money to this household? - [z.1]

1. [_] - [1] yes, monthly
2. [_] - [2] yes, two or three times a year
3. [_] - [4] yes, annually
4. [_] - [5] yes, on special occasions
5. [_] - [3] never

2. How (what channel) do they normally send money? - [z.6]

1. [_] - [z.6_1] bring it home in person
2. [_] - [z.6_2] by another relative
3. [_] - [z.6_3] by a neighbour
4. [_] - [z.6_4] by bus driver or stranger
5. [_] - [z.6_5] through a merchant
6. [_] - [z.6_6] through a bank account
7. [_] - [z.6_7] through western union / moneygram
8. [_] - [z.6_8] through the post office
9. [_] - [z.6_9] other

3. How long does it take for the money to get to you on average? - [z.7]

1. [_] - [1] immediately (1 day)
2. [_] - [2] In 2-7 days
3. [_] - [3] more than a week
4. [_] - [4] never received money

4. How are you informed when money is sent? - [z.8]

1. [_] - [1] email
2. [_] - [2] call from mobile phone
3. [_] - [3] call from a fixed line phone
4. [_] - [4] call from a public phone
5. [_] - [5] I am not being informed in advance
6. [_] - [6] other

(Select only 1 - ONE!)

sending money2 ----------

1. Does this household send money to another household? - [y.1]

1. [_] - [1] yes, monthly
2. [_] - [2] yes, two or three times a year
3. [_] - [3] yes, annually
4. [_] - [4] yes, on special occasions
5. [_] - [5] never

2. How (what channel) do you normally send money? - [y.6]

1. [_] - [y.6_1] Bring it home in person
2. [_] - [y.6_2] By another relative
3. [_] - [y.6_3] By a neighbour
4. [_] - [y.6_4] By bus driver or stranger
5. [_] - [y.6_5] Through a merchant
6. [_] - [y.6_6] Through a bank account
7. [_] - [y.6_7] Through Western Union / Moneygram
8. [_] - [y.6_8] Through the post office
9. [_] - [y.6_9] Other (Specify) _____ (Text)

3. The last time you sent money how long did the money take to get to them? - [var_1264]

1. [_] - [1] Immediately (1 day)
2. [_] - [2] 2-7 days
3. [_] - [3] more than a week

4. How did you inform the receiver about the money sent? - [z.8_207]
1. [_] - [1] email
2. [_] - [2] call from mobile phone
3. [_] - [3] call from a fixed line phone
4. [_] - [4] call from a public phone

5. [_] - [5] I did not inform that person
6. [_] - [6] other

(Select only 1 - ONE!)

Census ----------

1. Please list names of all those that will sleep in this homestead tonight and are 16 years of age or older? - [CensusDef]

1. male or female? - [d.4]

1. [_] - [1] Male
2. [_] - [2] Female

2. How old were you on your last birthday? - [d.5]

3. How are you related to the household head? - [d.6]

1. [_] - [1] head of hh
2. [_] - [2] spouse /partner
3. [_] - [3] son or daughter
4. [_] - [4] son or daughter-in-law
5. [_] - [5] grandchild
6. [_] - [6] parent
7. [_] - [7] parent-in-law
8. [_] - [8] brother or sister
9. [_] - [9] adopted/foster child
10. [_] - [10] other relative
11. [_] - [11] not related

(Select only 1 - ONE!)

4. What is your marital status? - [d.7]

1. [_] - [1] currently married
2. [_] - [2] cohabitate
3. [_] - [3] single
4. [_] - [4] widowed
5. [_] - [5] divorced
6. [_] - [6] separated

5. WHAT IS your HIGHEST LEVEL OF Education - Indicate number of years [d.8]

1. [_] - [1] none
2. [_] - [8] remedial
3. [_] - [6] traditional
4. [_] - [2] preschool
5. [_] - [3] primary

6. [_] - [4] secondary
7. [_] - [5] tertiary: BSc/BA
8. [_] - [9] tertiary: Masters
9. [_] - [10] tertiary: Phd
10. [_] - [7] vocational

(Select only 1 - ONE!)

6. What was your main activity during last 6 months? - [d.9]

1. [_] - [1] below school age
2. [_] - [2] full time scholar/ student / pupil
3. [_] - [3] housewife / unpaid work
4. [_] - [4] retired / pensioner
5. [_] - [5] unemployed
6. [_] - [6] disabled cannot work
7. [_] - [7] employed by non-family-all year: full time
8. [_] - [8] employed by non-family-all year: part-time
9. [_] - [9] employed by non-family–occasional/seasonally
10. [_] - [10] employed by family–all year: full time
11. [_] - [11] employed by family–all year: part-time
12. [_] - [12] employed by family – occasional/seasonally
13. [_] - [13] self-employed – all year: full time
14. [_] - [14] self-employed – all year: part-time
15. [_] - [15] self-employed – occasional/seasonally

(Select only 1 - ONE!)

7. WHAT DO you EARN EVERY MONTH IN TERMS OF SALARY OR WAGE? (estimate in local currency, numbers only) - [d.10]

_____

INFO: (home pay, i.e. net pay and add up payments that are made on a daily weekly or bi-weekly basis)

8. WHAT DO you EARN EVERY MONTH IN TERMS OF SELF EMPLOYMENT INCOME AND PROPERTY INCOME OR INCOME FROM AGRICULTURAL PRODUCE AND FARMING? (estimate in local currency, numbers only) - [d.11]

_____

INFO: Income not turnover or sales!)

9. WHAT DO you EARN EVERY MONTH IN TERMS OF PENSION, TRANSFER INCOME & SCHOLARSHIPS? (estimate in local currency, numbers only) - [d.12]

_____

10. How much money do you have for your free disposal each month (you can spend without consulting with anyone)? - [i.1]

_____

11. Do you belong to any groups or social networks? (multiple response) - [i.9]

1. [_] - [i.9_1] no

2. [_] - [i.9_2] church / religious
3. [_] - [i.9_3] trade unions
4. [_] - [i.9_4] sport clubs
5. [_] - [i.9_5] savings clubs
6. [_] - [i.9_6] radio clubs
7. [_] - [i.9_7] lobby groups
8. [_] - [i.9_8] reading clubs
9. [_] - [i.9_9] Internet groups/ blogs / mailing lists / discussion fora
10. [_] - [i.9_10] co-operatives
11. [_] - [i.9_11] burial clubs
12. [_] - [i.9_12] producer groups (eg cotton growers association)
13. [_] - [i.9_13] other

13. Are you a member of a credit or savings group or union? - [z.11]

1. [_] - [1] yes
2. [_] - [2] no

14. Do you have a bank account - [var_206]

1. [_] - [1] yes
2. [_] - [2] no

15. How do you store money when you receive cash? - [z.12]

1. [_] - [z.12_1] keep in the bank account
2. [_] - [z.12_2] keep in credit /savings group
3. [_] - [z.12_3] loan to family and friends
4. [_] - [z.12_4] Buy some kind of goods
5. [_] - [z.12_5] invest in the household
6. [_] - [z.12_6] keep in a personal "safe place"
7. [_] - [z.12_7] other

16. Which of the following do you worry about when holding cash. - [z.14]

1. [_] - [z.14_1] being robbed
2. [_] - [z.14_2] losing it
3. [_] - [z.14_3] spending it too quickly
4. [_] - [z.14_5] oher

Internet ----------

1. Do you know what the Internet is? - [iu.1]
   1. [_] - [1] yes
   2. [_] - [2] no

   (Select only 1 - ONE!)

2. Do you ever use the Internet? - [iu.2]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

3. Do you have an email address? - [iu.3]

1. [_] - [1] Personal Subscription
2. [_] - [2] Personal Free Account (eg hotmail, yahoo)
3. [_] - [3] Work Subscription
4. [_] - [4] Combination
5. [_] - [5] No email

(Select only 1 - ONE!)

4. What are you using email for (multiple response)? - [var_1401]

1. [_] - [var_1401_1] socially communicate with friends &family
2. [_] - [var_1401_2] communicate with colleagues for work purposes
3. [_] - [var_1401_3] communicate with fellow students for study purposes
4. [_] - [var_1401_4] interacting with local government
5. [_] - [var_1401_5] business purposes
6. [_] - [var_1401_6] other (please specify): _____ (Text)

5. Where do you use the internet (multiple response) ... - [iu.4]

1. [_] - [iu.4_1] at home
2. [_] - [iu.4_2] at another persons HOME
3. [_] - [iu.4_3] at an educational institution (school, University, etc.)
4. [_] - [iu.4_4] CYBER CAFÉ /Internet, Café
5. [_] - [iu.4_5] at work
6. [_] - [iu.4_6] using a mobile phone
7. [_] - [iu.4_7] Library
8. [_] - [iu.4_8] not at all

6. How often on average have you used the internet in the last 6 months? - [iu.5]

1. [_] - [1] Every day or almost every day
2. [_] - [2] At least once a week
3. [_] - [3] At least once a month
4. [_] - [4] Less than once a month

(Select only 1 - ONE!)

7. Would you say that compared to 6 MONTHS AGO, the number of HOURS A WEEK has - [iu.6]

1. [_] - [2] Stayed same
2. [_] - [3] Decreased

3. [_] - [1] Increased

8. On average, how much money do you spend PER WEEK on using the Internet? (in local currency) - [iu.7]

_____

9. What limits how useful the Internet is to you? - [var_1399]

1. [_] - [var_1399_1] there is no interesting or useful content for me
2. [_] - [var_1399_2] I do not always have access to a computer with Internet connection
3. [_] - [var_1399_3] I do not know much about how to use the Internet
4. [_] - [var_1399_4] the Internet is very slow
5. [_] - [var_1399_5] cost of access
6. [_] - [var_1399_6] lack of time
7. [_] - [var_1399_7] other (please specify): _____ (Text)

10. Which of these have you used the Internet for during the last 3 months? - [var_1400]

1. [_] - [var_1400_1] accessing the news
2. [_] - [var_1400_2] sending and receiving emails
3. [_] - [var_1400_3] playing online games
4. [_] - [var_1400_4] finding information I am interested in
5. [_] - [var_1400_5] downloading / listening to music
6. [_] - [var_1400_6] making Internet phone calls (VoIP)
7. [_] - [var_1400_7] education, as part of a course I was registered in
8. [_] - [var_1400_8] education, without being registered in a course
9. [_] - [var_1400_9] online banking
10. [_] - [var_1400_12] looking for information about training offers and courses
11. [_] - [var_1400_10] chatting
12. [_] - [var_1400_13] researching as part of a training course or your education
13. [_] - [var_1400_14] exchanging messages with other learners
14. [_] - [var_1400_15] downloading learning content which was provided online
15. [_] - [var_1400_16] doing an online course over the Internet: This means that a significant part of the learning content is being received via the Internet
16. [_] - [var_1400_11] paying bills online using credit cards
17. [_] - [var_1400_17] Accessing local government services online

11. If Internet is used for business purposes please explain how: - [var_1402]

_____

12. How confident would you feel if you had to carry out the following tasks. Please tell me on a scale from 1 to 5 where 1 means "I am not at all confident" and 5 means "I am very confident". By the values in between you may grade your opinion. How abo - [var_1403]

1 2 3 4 5 (Select 1 - ONE in each row)

1. [_] [_] [_] [_] [_] (a) using a search engine to find information on the Internet
2. [_] [_] [_] [_] [_] (b) using e-mail to communicate with others
3. [_] [_] [_] [_] [_] (c) downloading and installing software onto a computer
4. [_] [_] [_] [_] [_] (d) identifying the cause for computer problems
5. [_] [_] [_] [_] [_] (e) understanding text written in English
6. [_] [_] [_] [_] [_] (f) typing a letter or CV on the computer

7. [_] [_] [_] [_] [_] (g) participate in an online discussion forum on a topic of your interest

13. How easy would it be for you, for instance in your household or circle of friends, to find people who would be able and have the time to help you use computers or the Internet? Would it be - [var_1404]

1. [_] - [1] very easy
2. [_] - [2] quite easy
3. [_] - [3] not very easy
4. [_] - [4] not at all easy
5. [_] - [5] no answer

(Select only 1 - ONE!)

14. Could you imagine taking a training course online over the Internet? This means that a significant part of the learning content is being received via the Internet. - [var_1408]

1. [_] - [var_1408_1] yes, if it helps me in my job or for my studies
2. [_] - [var_1408_2] no
3. [_] - [var_1408_3] only if I get a certificate for it

15. Do you know what broadband Internet access is? - [var_1406]

1. [_] - [1] yes
2. [_] - [2] no

16. IS THE MAIN REASON WHY YOU DO NOT USE THE INTERNET THAT(Multiple Choice) - [var_1409]

1. [_] - [var_1409_1] I do not have access to a computer
2. [_] - [var_1409_2] I do not know how to use computers
3. [_] - [var_1409_3] I do not want to use the INTERNET
4. [_] - [var_1409_4] I have no one to email to
5. [_] - [var_1409_5] can't read/write
6. [_] - [var_1409_6] 0ther

Mobile ----------

1. Do you own and or use a mobile? - [var_1389]

1. [_] - [1] yes, I have a mobile phone and use it
2. [_] - [2] I do not have one but I use the household mobiles phone
3. [_] - [3] I do not have one but I use mobiles of other family members or friends
4. [_] - [4] I do not have one but I use mobiles of vendors
5. [_] - [6] no, and do not use one

(Select only 1 - ONE!)

2. When did YOU get Your first MOBILE PHONE? (Year) - [var_1390]

_____

3. What features does your mobile have? - [var_1391]

1. [_]Yes [_]No Camera/video
2. [_]Yes [_]No Calendar
3. [_]Yes [_]No clock
4. [_]Yes [_]No calculator
5. [_]Yes [_]No games
6. [_]Yes [_]No MP3 Music Player
7. [_]Yes [_]No Recorder
8. [_]Yes [_]No Notepad
9. [_]Yes [_]No Contact list
10. [_]Yes [_]No Internet Access (GPRS / EDGE/ 3G etc.)
11. [_]Yes [_]No Bluetooth
12. [_]Yes [_]No Infrared

4. Is it a prepaid or postpaid (contract) phone? - [var_1392]

1. [_] - [1] prepaid
2. [_] - [2] postpaid (contract)

(Select only 1 - ONE!)

5. Do the people who let you use their mobile phone charge you for your calls? - [var_1462]

1. [_] - [1] yes _____ (Number)
2. [_] - [2] no

(Select only 1 - ONE!)

6. Could you tell me how much you spent last MONTH for mobile phone usage (monthly subscription if any, calling and sending SMS)? - [var_1415]

_____

7. Is this expenditure more or less than usual, or the same? - [var_1416]

1. [_] - [1] More
2. [_] - [2] On average
3. [_] - [3] Less

(Select only 1 - ONE!)

8. How much are you currently paying for a one minute call to a mobile phone from the same network during peak time? - [var_1417]

_____

9. How much are you currently paying for sending an SMS? - [var_1418]

_____

10. Is the current cost of calls - [var_1419]

1. [_] - [1] low
2. [_] - [2] ok

3. [_] - [3] too high (Select only 1 - ONE!)

11. What prevents you from making more phone calls, from the mobile phone? - [var_1420]

1. [_] - [var_1420_1] Nothing – currently on optimum use
2. [_] - [var_1420_2] People I want to call have no phones
3. [_] - [var_1420_3] Cost of calls
4. [_] - [var_1420_4] Coverage
5. [_] - [var_1420_5] do not have a own handset
6. [_] - [var_1420_6] other (specify): _____ (Text)

12. If calls were cheaper would you: - [var_1421]

1. [_] - [1] make more calls
2. [_] - [2] make the same amount of calls and use the saved money for something else
3. [_] - [3] both
4. [_] - [4] do not know

(Select only 1 - ONE!)

13. How many ACTIVE local MOBILE PHONE numbers (SIM cards) do you have? - [var_1426]

_____

14. What is the name of your current service provider? - [var_1427]

_____

15. Would you consider changing your service provider if you could keep your number (Number portability)? - [var_1428]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

16. Have you ever ported your number to another network? - [var_1429]

1. [_] - [1] yes
2. [_] - [2] no
3. [_] - [3] not applicable

(Select only 1 - ONE!)

17. What has stopped you from switching providers/porting your number? - [var_1430]

1. [_] - [1] Happy with existing provider
2. [_] - [2] Cost of terminating service contract
3. [_] - [3] Admin processes too complicate
4. [_] - [4] other
5. [_] - [5] not applicable

(Select only 1 - ONE!)

18. Do other people use your mobile REGULARLY? (multiple choice) - [var_1431]

    1. [_] - [var_1431_1] no
    2. [_] - [var_1431_2] Family members
    3. [_] - [var_1431_3] friends
    4. [_] - [var_1431_4] Neighbours
    5. [_] - [var_1431_5] work colleagues

19. Do you make any of these people pay? - [var_1432]

    1. [_] - [1] yes
    2. [_] - [2] no

    (Select only 1 - ONE!)

20. If yes, do you add a mark up or just charge at cost - [var_1433]

    1. [_] - [1] cost
    2. [_] - [2] with mark up

    (Select only 1 - ONE!)

21. Could you calculate on average how many SMS you send daily? - [var_1434]

    _____

22. Could you calculate on average how many SMS you receive daily? - [var_1435]

    _____

23. Do you ever let others use your mobile phone to send SMS? - [var_1436]

    1. [_] - [1] yes
    2. [_] - [2] no

    (Select only 1 - ONE!)

24. To whom do you send SMSs to most? - [var_1437]

    1. [_] - [1] family members
    2. [_] - [2] friends
    3. [_] - [3] business contacts (client, supplier)
    4. [_] - [4] spouse / partner (Select only 1 - ONE!)

25. From whom are you receiving SMSs most? - [var_1438]

    1. [_] - [1] family member
    2. [_] - [2] friend
    3. [_] - [3] business contact (client, supplier)
    4. [_] - [4] spouse / partner

    (Select only 1 - ONE!)

26. Do you make and receive calls or just receive calls? - [var_1439]

1. [_] - [1] Make / receive
2. [_] - [2] Receive only
3. [_] - [3] Make only

27. Do you ever BEEP, FLASH, BUZZ, send a MISSED CALL or a "please call me" to people in order that they call you back, and if so, is it regular or occasional? - [var_1440]

1. [_] - [1] regular
2. [_] - [2] occasional
3. [_] - [3] never

(Select only 1 - ONE!)

28. Does anybody BEEP, FLASH, BUZZ or send a MISSED CALL or a "please call me", so that you can call them back, and if so, is it regular or occasional? - [var_1441]

1. [_] - [1] regular
2. [_] - [2] occasional
3. [_] - [3] never

(Select only 1 - ONE!)

29. Who pays your mobile expenses or bill? - [var_1442]

1. [_] - [1] Self
2. [_] - [2] Partner
3. [_] - [3] Parent
4. [_] - [4] Other Family Members
5. [_] - [5] Work
6. [_] - [6] Others (specify): _____ (Text)

(Select only 1 - ONE!)

30. Does using a mobile phone make your life easier? - [var_1443]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

31. Do you use the mobile phone for business purposes? - [var_1444]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

32. Does using the Mobile Phone save you TRAVELLING time & costs? - [var_1445]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

33. Are you using the Mobile to socialize? - [var_1446]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

34. Does using the Mobile Phone help you finding jobs? - [var_1447]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

35. Does using a Mobile Phone provide you with a sense of security for the case of emergencies? - [var_1448]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

36. Are you using the Mobile Phone to access news or are people call you to inform you about latest events? - [var_1449]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

37. Please have a look at your phone log and tell me how many of the last 10 calls were from (or try to recall if log is empty): - [var_1463]

1. family members _____ (Number)
2. friends _____ (Number)
3. business clients _____ (Number)
4. business suppliers _____ (Number)
5. financial service providers (bank) _____ (Number)
6. iInformation services _____ (Number)
7. employees _____ (Number)
8. employer _____ (Number)
9. others _____ (Number)

38. Please have a look at your phone log and tell me how many of the last 10 calls were to (or try to recall if log is empty): - [var_1463_1464]

1. family members _____ (Number)
2. friends _____ (Number)

3. business clients _____ (Number)
4. business suppliers _____ (Number)
5. financial service providers (bank) _____ (Number)
6. information services _____ (Number)
7. employees _____ (Number)
8. employer _____ (Number)
9. other _____ (Number)

39. What was the main purpose of the last calls that you received? - [var_1465]

1. social calls _____ (Number)
2. to get information from you _____ (Number)
3. to get help in an emergency _____ (Number)
4. to make a purchase/order _____ (Number)
5. to make a sale _____ (Number)
6. to take instruction from an employer _____ (Number)
7. other _____ (Number)

40. What was the main purpose of the last 10 calls that you made? - [var_1465_1466]

1. social call _____ (Number)
2. to get information from someone _____ (Number)
3. to get help in an emergency _____ (Number)
4. to make a purchase/order _____ (Number)
5. to make a sale _____ (Number)
6. to instruct an employee _____ (Number)
7. other _____ (Number)

41. Have you ever transferred airtime to someone else's mobile phone? - [var_1450]

1. [_] - [1] yes
2. [_] - [2] no

(Select only 1 - ONE!)

42. How often a week are you transferring airtime to someone else's mobile phone? - [var_1451]

43. Please state the main reasons for sending airtime: (multiple choices allowed) - [var_1454]

1. [_] - [var_1454_1] selling airtime to someone
2. [_] - [var_1454_2] paying for goods or services
3. [_] - [var_1454_3] as a favour to a friend or family member
4. [_] - [var_1454_4] other

44. What factors would make you prefer sending airtime rather than paying cash or transferring money via banks? - [var_1455]

1. [_] - [var_1455_1] zero transaction costs
2. [_] - [var_1455_2] no loss if mobile phone gets stolen
3. [_] - [var_1455_3] safe transaction with feedback on transfer

4. [_] - [var_1455_4] wide acceptance of airtime as a means of payment
5. [_] - [var_1455_5] other

45. Have you ever received airtime from someone else's mobile phone? - [var_213]

1. [_] - [1] yes
2. [_] - [2] no

46. How often a week do you receive airtime on your mobile phone from someone else? - [var_1452]

_____

47. Please state the main reasons for receiving airtime: (multiple choices allowed) - [var_1453]

1. [_] - [var_1453_1] buying airtime from someone
2. [_] - [var_1453_2] being paid for goods or services
3. [_] - [var_1453_3] as a favour from a friend or family member
4. [_] - [var_1453_4] other

48. What factors would make you prefer receiving airtime rather than cash? - [var_1456]

1. [_] - [var_1456_1] zero transaction costs
2. [_] - [var_1456_2] no loss if mobile phone gets stolen
3. [_] - [var_1456_3] safe transaction with feedback on transfer
4. [_] - [var_1456_4] wide acceptance of airtime as a means of payment
5. [_] - [var_1456_5] other (specify): _____ (Text)

49. Would you get a mobile phone if...? (multiple choice) - [var_1457]

1. [_] - [var_1457_1] I would not get one anyway
2. [_] - [var_1457_2] If handsets were cheaper
3. [_] - [var_1457_3] if calls would cost less
4. [_] - [var_1457_4] If I knew how to use them
5. [_] - [var_1457_5] if coverage were better
6. [_] - [var_1457_6] Other (specify): _____ (Text)

50. Which form of mobile would you get? - [var_1458]

1. [_] - [1] Contract
2. [_] - [2] Pre-paid

(Select only 1 - ONE!)

Appendix 3: Authorisation Letter to KNBS

University of Nairobi
School of Computing and Informatics

Telephone: 4446544, 4444918
Telegrams: "Varsity" Nairobi
Telefax: 4447870
Email: waema@uon.ac.ke

P. O. Box 30197
Nairobi
Kenya

Our Ref: SCI/APM/TMW
14 December, 2009

Director-General
Kenya National Bureau of Statistics, Nairobi

Dear Mr. Kilele.

Re: Request for Information on Cluster Classifications

Margaret Nyambura Ndung'u is a PhD student at the School of Computing and Informatics looking at the development outcomes of ICT usage at the household level. She is focusing on households within Nairobi that are regarded to be at the bottom of the pyramid and she has narrowed on those classified as lower middle class. She would like obtain information on the criteria used to classify the urban clusters as 1=Upper Class, 2=Upper Middle Class, 3=Middle Class, 4=Lower Middle Class and 5=Lower Class.

I am supervising her studies. Kindly advice how she can be assisted. Any information that will help her understand the classification will be highly appreciated.

Yours faithfully,
Prof. Timothy Mwololo Waema

[1] Interview with household C002, 17th February 2010
[2] Interview with household A016, 13th February 2010
[3] Interview with household A016, 13th February 2010
[4] Interview with household B009, 14th February 2010
[5] Interview with household C002, 17th February 2010
[6] Interview with household B025, 16th February 2010
[7] Interview with household B021, 16th February 2010
[8] Interview with household C010, 17th February 2010
[9] Interview with household B016, 16th February 2010
[10] Interview with household C004, 17th February 2010
[11] Interview with household A008, 12th February 2010
[12] Interview with household C014, 17th February 2010
[13] Interview with household B008, 15th February 2010
[14] Interview with household B001, 15th February 2010
[15] Interview with household C002, 17th February 2010
[16] Interview with household B008, 15th February 2010
[17] Interview with household B017, 15th February 2010
[18] Interview with household B002, 16th February 2010
[19] Interview with household B015, 15th February 2010
[20] Interview with household B016, 14th February 2010
[21] Interview with household C002, 17th February 2010
[22] Interview with household C006, 17th February 2010
[23] Interview with household C017, 18th February 2010
[24] Interview with household B013, 15th February 2010
[25] Interview with household B025, 16th February 2010
[26] Interview with household C001, 17th February 2010
[27] Interview with household B008, 15th February 2010