

The Impact of ICT access on the Economic Development in Kenya: The case of Women in Kitale Municipality

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Abstract- The background of this study was the gender digital divide which is the increasing access gap to ICTs among women as ICTs are increasingly becoming a key driver for development in developing countries. The aim of this study was to measure ICTs use and access among women in Kitale Municipality and the effects of ICT accessibility on women's participation in development in Kitale Municipality. The study adopted a descriptive survey research design and a random stratified sampling technique to select the total number of respondents in this study which was three hundred and ninety (390). Data collection instrument was a structured questionnaire. Data analysis was through descriptive statistics and logit regression model. Study results indicated that access to ICT by women was significant in explaining use of ICT for participation in development. The results indicated that increase in accessibility of ICT reduced the log odds for use of ICTs for participation in development by women. The study has implications for the Kenyan ICT Masterplan launched in April 2014 to ensure equitable and non-discriminate access to ICTs across urban and rural areas, and gender lines.

IndexTerms—Accessibility, digital divide, development, economic, political, social.

I. INTRODUCTION

During the 47th session in 2003, the United Nations Commission on the Status of Women considered “women’s participation in development and access to the ICTs as the key instrument for the advancement of women’s empowerment [1]. Access to ICTs has been considered for the last decade imperative in facilitating participation of women in political, economic and social development and bridging the gendered digital divide [2]. In achieving Kenya’s Vision 2030, its imperative to determine the role of access to ICTs as a driver of inclusive participation in development and hence the need for the study.

There are, however challenges to women’s access to ICTs and women’s participation in development. In 1995, the United Nations Commission on Science and Technology for Development conducted research for the 4th world conference on women and identified significant gender differences in access to, control of and advantages accruing from a wide range

of technological developments then concluded that “the information revolution appeared to be by-passing women” [3]. This gendered digital divide goes hand in hand with an alarming underrepresentation in all spheres of development of women in Kenya. For example Kenya’s female political representation currently stands at 19.1% against Rwanda’s 63.8%, South Africa 44.8 %, Tanzania 36% and Uganda 35% [2].

To bridge these glaring disparities, the 23rd special session of the general assembly recognised that increased access to ICTs provided women with new opportunities for participation in development [4]. The problem of inadequate ICT access for women exists and needs to be addressed urgently. Gender disaggregated data on use of and access to ICTs collected from Kenya, Uganda, Tanzania, Rwanda, Nigeria, Ghana, Mozambique, Namibia, Botswana and South Africa indicated that women and men are not equally able to access and use ICTs [5]. Women generally have less access to ICTs and use them sub-optimally and this increases as the technologies and services become more sophisticated and expensive. With the exception of Botswana, Tanzania, Namibia and Cameroon computer use and ownership, mobile adoption and internet access was lower among women in all the countries surveyed with Kenya and South Africa having the highest gender disparities.

Overall, ICTs are grouped under two categories: ‘traditional’ and ‘new’. Traditional (old) ICTs constitute non-electronic media such as print and analogue technologies, i.e. radio, television, fixed line telephones, and facsimile machines. These technologies have been gradually ingrained in the daily lives of people and communities. ‘New’ ICTs consist of computers (in all their myriad manifestations) and data processing applications accessible through their use (email, Internet, word processing, cellular phones, wireless technologies and other data processing applications) [6].

According to International Telecommunications Union statistics in Facts and Figures, 2011, the most accessible ICT tool is the mobile phone where 86.7% of the world’s population owned a cell phone. Only 10% of the world’s

population had no cell phone coverage and there are regions in the world where there are more mobile phone subscriptions than inhabitants, this is in Russia, Europe, and the Americas.

The gap is still important in Africa, where only 53% own a cell phone, though the number of cell phone users is increasing rapidly. Across all countries a woman is 21% less likely to own a mobile phone than a man. This figure increases to 23% if she lives in sub-Saharan Africa, 24% if she lives in the Middle East and 37% if she lives in South Asia. Mobile phones were still identified as holding the greatest potential for opportunities for increased ICT access among women in developing countries. The study showed that ICT is acquired via private or public internet access, relevant content available on the internet, effective communications infrastructure and networks, by purchasing them from service providers and suppliers of ICTs, public-private partnerships to equip institutions that may not afford ICT acquisition such as schools in rural areas, social halls and tele-centers, innovative applications. Mobile phones have become the primary means of communication particularly in countries with poor telecommunications infrastructure [7].

The range of ICT tools available to women in developing countries include laptops which are preferred by some women due to portability and usability of these devices which is nearly as good as with a desktop computer, with an increase in flexibility for power since it has a battery that can last for several hours even with no direct power supply and relatively resistant to operating environmental conditions such as dust, temperature and humidity. Personal Digital Assistant, Smart phones and Ultra Mobile Personal Computers remain in the highest price range of all the devices considered, being quite delicate to work in harmful operating conditions. However they still remain a favorite with some women because they count with battery and low consumption components and their usability is greater than the basic mobile phones but worse than devices with bigger screens and keyboards. Another segment of female consumers find that desktop computers and modems are logically the most adequate for accessing Internet content and services – Internet is designed for them. On the other hand, their requirements of power and operating conditions are among the most restrictive ones of the devices considered [8].

The overall research problem addressed in this study was that in spite of access to ICTs becoming a key driver for development in developing countries and women and men having different needs and constraints when accessing and using ICTs, gender considerations are rarely the focus of policy makers [9]. Policies that neglect the specific context of the lives of women and men are more likely to fail, since they will not meet the needs of all people equally particularly when the neglected group comprises 50% of the population. This is why the inclusion of gender considerations is critical and needs to be integral to the policy process. The digital divide refers to the increasing access gap between those who have and those who do not have: access to information and communication technologies; access to content that benefits them socially and economically; skills to take advantage of ICT services; the ability to afford to pay for digital services. The gender digital divide hampers women's economic and socio-political progress. Access becomes essential because "exclusion will mean severely limiting life chances [10].

According to Kenya Institute for Public Policy Research and Analysis (2013) women in Kenya are a severely marginalized group economically as, although nearly 40% of Kenyan households are run solely by women only 29% of those earning a formal wage throughout the country are women. Without aggressive policy interventions to bridge the gender digital divide, there will be no way of achieving Kenya's Vision 2030 of creating a globally competitive and prosperous nation with a high quality of life for all its citizens by 2030 as women constitute half of the Kenyan population.

Lack of equitable access to ICTs and consequently lack of participation of women in the national development agenda holds back growth of individuals, the development of countries and evolution of society [2]. The focus of the study was on determining the effects of access to ICT tools on women's participation in economic, social and political development in Kitale Municipality in line with the ICT for Development (ICT4D, 2014) components access to ICTs, ability to use ICTs, actual use of ICTs and impact of using ICTs.

1.1 Study Purpose

This purpose of this study was to determine the effects of accessibility to ICT tools on women's participation in development in Kitale Municipality.

1.2 Objectives of the Study

- To measure ICT access and use among women in Kitale Municipality.
- To determine effects of accessibility of ICTs on women's participation in development in Kitale Municipality.

1.3 Contribution of the Paper

The study aims to fill the gap in the knowledge on what development issues women use their ICT tools to participate in as this is not clearly researched and documented on. The available studies were on earlier forms of ICTs such as television, radio and print media while studies on digital ICTs and social media were lacking. The study advises policy makers on women empowerment towards ICT based on findings from the study. This study aims to show how important access to ICTs is in relation to inclusivity and women's participation in development so as to encourage stakeholders and policymakers to prioritize concerted efforts towards women's increased access to ICTs.

Access to ICT tools can provide opportunities for women participation in political, economic and social development issues and address long standing challenges faced by women such as the legal and customary barriers to access to land, use of natural resources, access to capital and credit. Increased access to ICTs can also be tools to alleviate lack of opportunities, resources, training and skills, access to technology, as well as wage differentials which all stand in the way of the economic empowerment of women.

The study also aims to inform stakeholders such as The ICT board of Kenya, The Communication Commission of Kenya, Kenya National Institute of Civic Education (K-NICE), The Judiciary, The Government and policy makers so that they can engender the ICT Policy with the aim of bridging the Gender Digital Divide with the aim of enhancing participation of women on development issues. Policy makers can then prioritize the affordability of ICT tools, the internet and consequently, compel telecoms to lower their data tariffs.

II. LITERATURE REVIEW

2.1 Theoretical Review

Theories in this area include the Soft Systems theory (Checkland, 1981) which argues that for an ICT solution to be viable, social and political elements that confound the problem definition and resolution must be taken into account, as much as the technical functionality, the Task Technology Fit Theory [11]. Access to ICTs is more likely to have a positive impact and be used if the capabilities of the ICT match the tasks that the user must perform. These theories point to the use of ICT to resolve user's problem more so the socio-political aspects of the user's needs as well as assist the user perform tasks as a key indicator of viability and hence use of ICTs that become available to users [12].

In the area of ICT adoption, studies in this area have taken 3 approaches [13]. The first being diffusion approach, from Roger's Diffusion of Innovation theory comprises four elements: invention, diffusion through the social networks, time and consequences and adoption determinants include relative advantage if technology is perceived as better than its alternatives or the idea it supersedes, the more compatibility [14]. The profile of the late adopter of technology is predominantly female.

The second is the adoption approach describes and explains the adoption decision of users applying different individual and social decision making theories. Three widely used models include the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the extension of TRA into a Theory of Planned Behavior (TPB) [13]. The TAM presented by Davis suggests that when a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it [11]. This includes its perceived usefulness and its perceived ease of use. The TRA model includes four general concepts namely: behavioral attitudes; subjective norms; intention to use; and actual use of ICTs. The TPB is an extension of the TRA and deals with conditions where the individual has no control over their behavior.

2.2 Access to ICTs

The term ICTs has been used to encompass technological innovation and convergence in information and communication leading to the development of so-called information or knowledge societies, with resulting changes in social interaction, economic and business practices, political engagement, education, health, leisure and entertainment. There has been a growing understanding that these technologies can be powerful instruments for advancing economic and social development through the creation of new types of economic activity, employment opportunities, improvements in health-care delivery and other services, and the enhancement of networking, participation and advocacy within society. ICT also has the potential to improve interaction between Governments and citizens, fostering transparency and accountability in governance. While the potential of ICT for stimulating economic growth, socioeconomic development and effective development is well recognized, the benefits of ICT have been unevenly distributed along gender lines [15].

Universal access (UA) is when everyone can access the service somewhere, at a public place, thus also called public, community or shared access. Universal service (US) describes when every individual or household can have service, using it

privately, either at home or increasingly carried with the individual through wireless devices [16]. The hallmark of Universal Access and Universal Service is when all citizens can use the service, regardless of location, gender, disabilities and other personal characteristics.

Access is defined as the ability to make use of the information and the resources provided. The factors identified as constraints to access and use, i.e. poverty, illiteracy, including computer illiteracy, and language barriers are particularly acute for women. Further women are less likely to own communication assets such as phones and computers. This therefore confirms that women's access to ICT is constrained by factors that go beyond issues of technological infrastructure. Socially constructed gender roles and relationships therefore play a key role in determining the capacity of women to participate in the information society and development [15].

Four successive kinds of access are distinguished, mental access which is the elementary digital experience, interest and motivation and unattractiveness of new technology. The second is material access which is possession of computer and network connections. The third is Digital skills access which is the technological education, user friendliness and social support. The fourth is usage access which is usage opportunities and their distribution [17].

Real access goes beyond physical access to bridge all aspects of digital divide, he provides an assessment of the existing access-divide in the world [18]. Access-divide comprises, among others: income divide; telecommunication access-divide; education access-divide; language and content access-divide; lack of access to the people with disability; gender access-divide; and rural-urban divide. Access means not only access to technology but also access to information and know-how. Access is affected by age, class, gender, race or by one's socio-economic status. The most basic quantitative indicator of access is the number of women and men who have access to computers, telephones and the Internet. The factors affecting this access are usually the presence or absence of telecommunications and Internet infrastructures. However, quantitative indicators of access are only the starting point. The more significant indicators are often qualitative in nature. These include the quality of access to information that is useful, empowering and relevant for women.

2.3 Women Participation in Development

Development recognizes the blurring of boundaries and responsibilities for tackling social and economic issues, a citizenship that emphasizes rights and responsibilities is also part of an emerging consensus. It draws to our attention a shift in responsibility, a stepping back of the state and a concern to push responsibilities onto the private and voluntary sectors and, more broadly, the citizen. Development is connected to the concern about social capital and the social underpinnings necessary to effective economic and political performance. Development is a multifaceted process, where success cannot be reached without the interplay of all actors in political, social and economic field [19].

Examples of women's participation in development thanks to access to ICTs include the E-Seva programme in India which showed economic benefits for the women trained in managing the ICT kiosks [20]. An initiative in South Africa used an online platform to encourage girls to engage policy makers on access to transport and employment and over public spaces where they felt safe to meet to socialize [5]. Women in

Indonesia who were trained in ICT skills gained greater status in their village but were also asked to take on administrative tasks for the local elites [21]. A Peruvian women's movement used social media to provoke government actions on sexual harassment by gathering data on crimes [22]. In South Africa women campaigned online to keep a women's shelter open in Cape Town [23]. In Brazil, a program that coordinates services for pregnant women used online data to monitor and coordinate health provision resulted in a rise of women attending all recommended prenatal visits rising from 10% to 80%. In Togo an association of rural women's organizations in Togo used mobile phones to create learning networks for property rights education. In Kenya, online services provide confidential and reliable information on sexual and reproductive health which is a cultural taboo to girls [6].

However, the gendered aspects of ICT use, have not considered from the perspective of those experiencing it. Some research focuses on developing a better understanding of how these gender differences in ICT use came about. This research invokes such theories as social construction [24] [25] or individual differences [26] [27] in developing theoretical explanations that incorporate social influences underlying inequality between the genders. It is directed at coping with the dynamics of inequality, not challenging the legitimacy of underlying social influences or undoing them.

Some researchers in discussing access to ICTs focus mainly on the value of social equity and inclusion. The very resources that people need access to are the same resources to which they will be able to contribute [28]. Thus access and use are closely inter-related: access to resources and the creation of resources are inter-dependent. Similar to Critical Social Theory (Adam, 2002) which states that although people can consciously act to change their socio-economic circumstances, this ability is in equal measure constrained by various forms of social, economic and political denomination [29]. A research approach based on critical theory is needed in order to view information technology within a broader context of social and political relations [30]. The social nature of activities associated with the development and implementation of ICTs and the management of people who carry out these activities leads naturally to considerations of social and political power.

Comparative theories of ICT that relate to social development include Social Informatics which places 'social shaping' of technology as central tenets [31] [32] [33] [34], where looking at what people do with technology rather than what they have is pertinent for making effective use of ICTs for social change and social inclusion and Community Informatics suggests that information and communications technologies (ICTs) enable community processes and the achievement of community objectives including overcoming "digital divides" both within and among communities [35]. The two theories are among the key theories informing this study.

Examples of women use of access to ICTs for social development include: An Iraqi women's group called Wadi, used online tools to campaign for an anti- female genital mutilation (FGM) law, to engage rural women and to gather evidence of the practice, this led to the Kurdish regional government enacting new laws that make the practice of FGM a criminal offence [36]. In China, graphic images of violence against women taken on mobile phones such as the case of a forced abortion of Feng Jianmei in June 2012 stirred public

outrage and resulted in the seeking of justice for the victim [21].

According to Kenya's Vision 2030, the financial services sector plays a critical role in the development of the country by providing intermediation between savings and investments [36]. These will be achievable through among others promoting mobilization of savings and access to financial services and providing equal access to financial services.

Research in this area has been on considering gender as a factor of production in better harnessing diversity in pursuit of effectiveness and productivity [38] [39] [40] [41] where problems of inequality are viewed in terms of wasted resources, with increased equality being promoted as a means of optimizing efficiency.

Examples of women's use of access to ICTs to participate in economic development include: Domestic Workers in Jamaica, the majority of whom are female, used ICTs to campaign for the adoption of International Labor Organization (ILO) Convention 189. This improved their wages and working conditions [42]. In Philippines, digitization of public records has helped address structural causes of gender inequality, such as denial of land rights, by requiring that renting of natural resources be recorded as co-owned by husband and wife [6]. In Afghanistan, a women's education programme teaches women how to use Bitcoin- a digital currency and software based online payment system, women are paid in Bitcoin for articles and blogs they write, giving them greater control over how they spend their earnings [43]. For Muslim women in Nigeria they were able to have direct links with their business partners without compromising their purdah status. While in Guyana women's weavers society used the internet to sell their handmade hammocks online. Programs in Tanzania and Nairobi have enabled women farmers to use their phones to negotiate directly with buyers. Women's use of M-Pesa in Kenya and Tanzania has increased their control over savings and expenditure, reduced business costs, increased profits and financial security [44].

Researchers in this area have shown how community based resource centers equipped with ICTs can play a key role in informing Kenyans, especially women of critical issues in the electoral process and enhance women's interaction and be used for generating, storing and exchanging strategic information and thus enable women to make informed decisions and participate effectively in the electoral process [45]. Barriers to political participation include high levels of illiteracy especially in hunter gatherer communities, practices that limit freedom of choice in who women elect such as family voting where men coerce family members to vote according to personal wishes and preferences instead of individual ones, running for office for women is financially prohibitive and dangerous due to violence.

Since Kenya attained formal independence in 1963, women have been seeking to effectively participate alongside men, in development and decision-making in all aspects of public life. But in the first four decades of post-colonial rule, progress towards women's access to formal political leadership positions, has been slow due to a combination of structural obstacles which include: i) deeply embedded patriarchal socio-cultural values; ii) undemocratic institutions and policy frameworks and iii) low levels of civic and gender awareness. Due to the constricted formal political space, women's political

engagement operated outside the State, with minimal support from the largely patriarchal State [46].

III. RESEARCH METHODOLOGY

The study applied descriptive survey research design since the study used both quantitative and qualitative data collection methods to describe the role of access to ICTs in promoting women's participation in economic, social and political development in Kitale Municipality. Survey design requires the researcher to make a detailed examination of the population to determine its characteristics and it is then inferred that the population has the same characteristics [47].

The target population for this study was women of varied age groups, educational background and socio-economic status. The age criteria being 18 to 65 because this is the age bracket actively involved in development in Kenya. The minimum age for participation in socio-political development is 18 years of age while age of retirement recognized by the government of Kenya is 65 years and hence this is the age cluster which is actively involved in economic development.

The study used stratified random sampling method to identify a representative sample where basic generalizations were deduced [48]. Stratified random sampling technique is a technique that identifies sub groups in the population and their proportions and selects from each sub group to form a sample

[49]. The stratification was identified on the basis of the 10 civic wards in Kitale Municipality namely: Webuye, Kibomet, Lessos, Mumia, Tuwani, Milimani, Sokoni, Masaba, Hospital and Kipsongo.

Stratified Random Sampling Technique will therefore be used to get a representative sample in the accessible population. Determination of sample size will be done using published tables. Kretjicie and Morgan table (Kretjicie and Morgan, 1970) with a confidence level of 95% and 5% margin of error the sample size was 390. The female population age 18 to 65 years in Kitale municipality is 37,701 according to the 2009 census [50].

The survey questionnaire was divided into four sections, capturing individual characteristics, ICT access and use among women in Kitale municipality and participation in development. Analysis of collected data was through descriptive such as percentages and mean scores and logit regression.

IV. RESULTS

4.1 Age of the Respondents

Fig. 1 shows the respondents' distribution by age. The results indicate that 42.3% (165) of the respondents were between the ages of 18-25 years while those between the ages of 55-65 years were 1.6% (6).

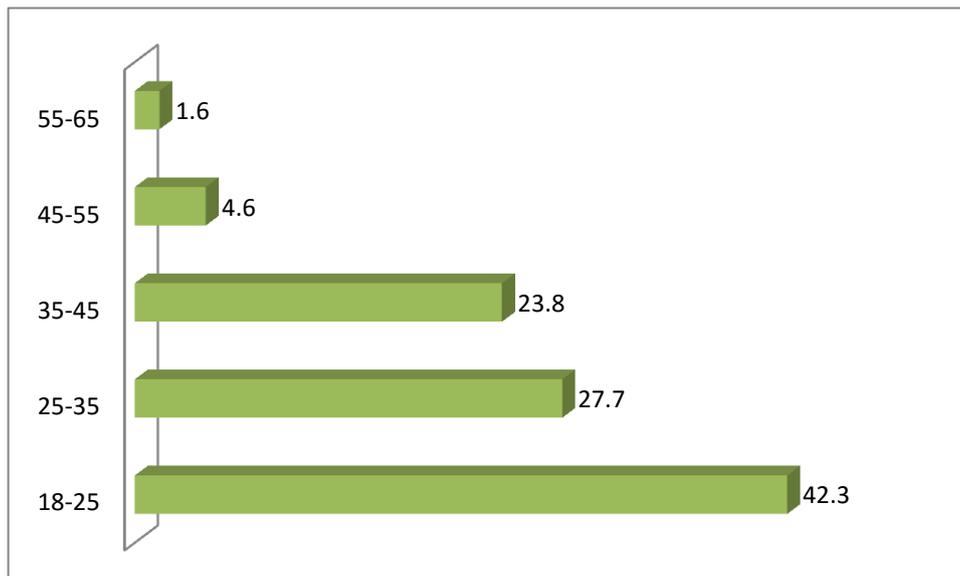


Figure 4.1: age of the respondents

4.2 Education level of respondents

The study also sought to establish the education level of respondents. Results are presented in Table 1. The results indicate that 44% (172) of the respondents had upper secondary/post-secondary/non-tertiary education. Those with post tertiary education (post graduate diploma/masters/PhD) were 2% (8).

Table 1: Education level of respondents

Education Level	Frequency	Percent
Primary/Lower	70	18
Lower secondary	117	30
Uppersec/Post-secondary/Non-tertiary	172	44
Tertiary level	23	6
Post-tertiary(Postgrad Dip/MSc or PhD)	8	2
Total	390	100

4.3 Employment Status

Fig. 2 shows the employment status of the respondents. Majority 167 (42.8%) stated that they were self-employed,

followed by 126 (32.3%) who were employed. The rest (24.9%) were classified as others which included students, housewives, the unemployed and retirees.

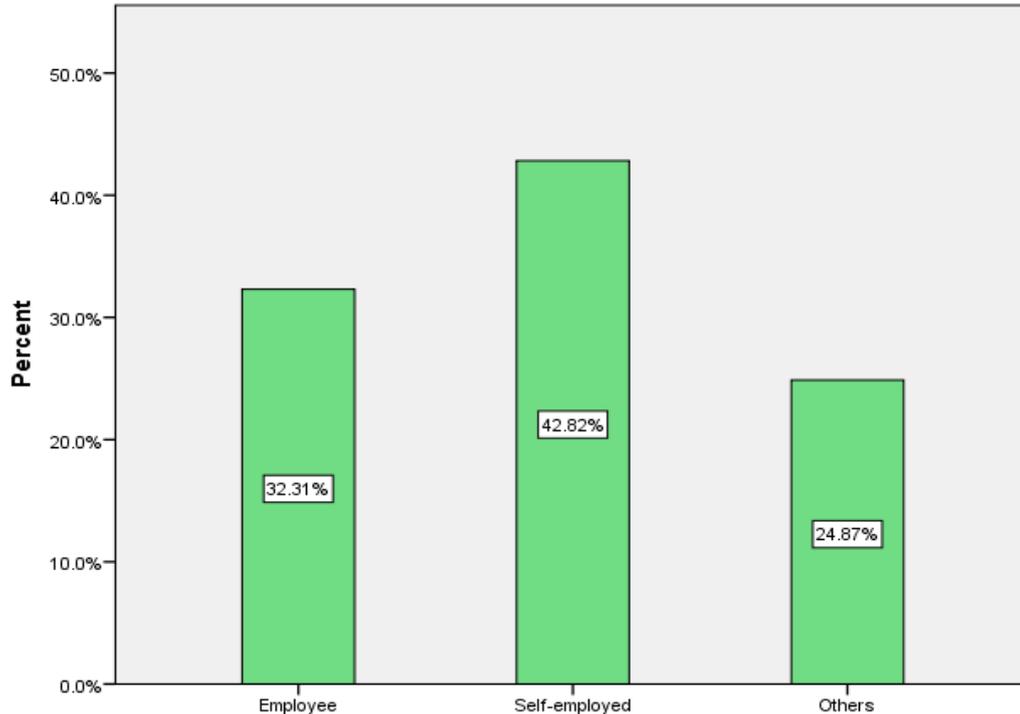


Figure 2: Employment Status

4.4 ICT Access and use among Women in Kitale Municipality

This study investigated access to and use of ICTs among the women who participated in the study. Table 2 represents proportion of women that had in the twelve months prior to the study accessed and used ICT tools. Majority of the respondents

388 (99.5%) had used a mobile phone, whereas 108 (27.7%) of the respondents had used a computer while those who had accessed internet were 107 (27.4%). These results indicate that access to mobile phones is very high while access to computers and internet is low among women in Kitale municipality.

Table 2: Level of Access of ICTs among women in Kitale municipality

ICT tool	Frequency	Percent
Mobile Phone Usage	388	99.5
Computer Usage	108	27.7
Internet Usage	107	27.4

4.5 Access to and use of ICTs and Participation in Development

4.5.1 Political Development

Table 3 shows the responses to items related to access to and use of ICTs for political development. The study enquired from the respondents whether in the 12 months prior to the study they had used ICTs to participate in the various political

development activities. The study established that 62 (15.90%) of the respondents indicated that they had used ICT tools to learn about the constitution and their constitutional rights while 37 (9.49%) had used ICT tools to access political information and for civic education. Further results indicated that only 12 (3.08%) of the respondents indicated that they used ICT tools to follow parliamentary proceedings, debates and current

affairs. Additionally, 11 (2.82%) of the respondents had used ICT tools to browse government websites, access government services such as police P3 form and enquire on information disseminated by government. These findings indicated that

usage of ICTs in Kitale municipality for women’s participation in political development was low.

Table 3: Access to ICT for Political Development

Which political activities of the below listed have you used ICTs to do in the last 12 months?	Frequency	Percent
Learn about the constitution and your constitutional rights	62	15.9
Access political information and civic education	37	9.49
To follow parliamentary proceedings, debates and current affairs	12	3.08
To browse government websites, access government services such as police P3 form and enquire on information disseminated by government	11	2.82
To participate in political debates, access your representative interact with constituents and contribute to political discussions	6	1.54
To register online for political activities	4	1.03
Get information on political events, parties and candidates, election dates and results	3	0.77
Check your voter registration details, polling station and status	2	0.51
To campaign for or finance a political party or candidate	1	0.26

4.5.2 Social Development

Table 4 shows the responses to the access to ICT tools for social development. The tasks pertain access and use of ICT tools for social development. 81% of the respondents used ICTs for participation in social development. Majority 54 (13.85%) of the respondents indicated that they had used ICT tools to access religious, inspirational, entertaining and recreational materials such as music videos. This was closely followed by 53 (13.59%) who used ICT tools for socializing, dating and increased contact with family and friends through social media, skype, email, online chat or SMS. Others had used ICT tools to increase contact with those who shared

similar religious beliefs and political views 45 (11.54%). Further results indicated that ICT tools were used to access social support, encouragement and mentorship 43 (11.03%), access to learning, computer based training and up to date information 38 (9.74%) and to increase contact with business associates, customers, students, teachers 33 (8.46%) among others.

Table 4: Access to ICTs for Participation in Social Development

Which Social Activities of the below listed have you used ICTs to do in the last 12 months?	Responses	Percent
Access religious, inspirational, entertaining and recreational materials such as music videos	54	13.85%
For socializing, dating and increased contact with family & friends via social media, skype, email, online chat or SMS	53	13.59%
Increase contact with those who share similar religious beliefs, political views	45	11.54%
To access social support, encouragement and mentorship	43	11.03%
Access to learning, computer based training and up to date information	38	9.74%
Increase contact with business associates, customers, students, teachers	33	8.46%
To download government forms such as P3,police abstract, KRA tax returns forms, PIN application	14	3.59%
Increase contact with those who share similar hobbies and interests, blogging	11	2.82%
To access e-library services and online publications, online newspapers and magazines	9	2.31%
Online appointment booking or license or certificate application e.g. marriage, death and birth certificate	8	2.05%
To seek health information on injury, disease and nutrition	7	1.79%

The technological determinism theory (Bradley, 2005) posits that a society's technology drives the development of its social structure and cultural values implying that technology is the key mover and determinant in history and social change. It emphasizes the impact of technology on these facets of a society and the capacity of technology to frog leap a society to other stages of socio-political and economic growth. The findings of the study confirm this theory, use of ICTs that have shaped the social change such as social media or those that shape economic transactions such as money transfer and virtual banking have been revolutionary and the findings of the study confirm that these ICT applications have enabled higher participation for women in development.

4.5.3 Economic Development

Table 5 shows responses on the question on respondents' use of ICT tools for economic development. 55% of the respondents used ICTs for participation in economic development. Majority 81(20.77%) of the respondents used ICT tools to make savings, send or receive money or get information on how to use the services while 38(9.74%) used ICT to advertise, search for, get information on buying or selling of goods and services. The respondents who used ICT tools to find out about/ apply for get loans (e.g Mshwari) or pay back loans were 35 (8.97%).

Table 5: Access to ICTs for Participation in Economic Development

Which economic activities of the below listed have you used ICTs to do in the last 12 months?	Responses	Percent
Make savings, send or receive money or get information on how to do it	81	20.77%
Advertise ,search for ,get information on, buy or sell goods and services	38	9.74%
Find out about/ apply for/get loans(e.g. Mshwari) /payback loans	35	8.97%
Online financial management such as to pay via money transfer for online utilities e.g. water, electricity, amenities, security ,bus tickets, fees,	15	3.85%
To get information on funding, economic and job opportunities	12	3.08%
Use internet or mobile banking get information on and transact on bank accounts or shares	9	2.31%
Looking for a job /submitting job applications	9	2.31%
To support business operations e.g. to send letters and plan work	6	1.54%
Participating in professional networks like LinkedIn and Xing	5	1.28%
ICTS have offered you economic opportunities	3	0.77%

4.6 Effect of Accessibility of ICTs on Women Participation

4.6.1 Accessibility and use of ICTs for political development

Table 6 indicates that 67% of those who had no accessibility to ICT used it to an extent of 33% for political

development. All respondents with 25% accessibility (100%) had used ICT for political development to an extent of 33%

Table 6: Accessibility and use of ICT for political development

Accessibility	Used ICT for political development in last 12 months					Total
	11%	22%	33%	44%	55%	
0%	33.30%	0%	66.70%	0%	0%	100%
12.50%	0%	40%	20%	40%	0%	100%
25%	0%	0%	100%	0%	0%	100%
37.50%	50%	0%	0%	25%	25%	100%
Total	83.70%	2%	7.10%	6.10%	1%	100%

Table 7 indicates that there was a significant association between accessibility to ICT and use of ICT in political development ($\chi^2 = 110.872$; $p < 0.05$).

Table 7: Chi-Square Test of association between accessibility and use of ICT for political development

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	110.872	16	0.000
Likelihood Ratio	50.055	16	0.000
Linear-by-Linear Association	27.641	1	0.000
N of Valid Cases	98		

4.6.2 Accessibility and use of ICTs for social development

Table 8 indicates that all respondents with 100% of the respondents with 50% accessibility used ICT for social

development to an extent of 10-27%. While 91% of those who had no access to ICT tools had barely used ICT for social development in preceding 12 months.

Table 8: Cross tabulation of accessibility against use of ICT for social development

Accessibility	Extent of use ICT for social development in last 12 months					Total
	0-9%	10-27%	28-45%	46-63%	64-100%	
0%	91.70%	4.20%	4.20%	0.00%	0.00%	100.00%
12.5%	16.70%	16.70%	33.30%	33.40%	0.00%	100.00%
25%	50%	0.00%	50.00%	0.00%	0.00%	100.00%
37.5%	20.00%	20.00%	40.00%	0.00%	20.00%	100.00%
50%	0.00%	100%	0.00%	0.00%	0.00%	100.00%
Total	71.80%	22.90%	4.40%	0.60%	0.60%	100.00%

The results in Table 9 indicate that there was a significant association between accessibility and use of ICT for social development ($\chi^2 = 303.231$; $p < 0.05$)

Table 9: Association between accessibility and use of ICT for social development

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	303.231	45	0.000
Likelihood Ratio	91.899	45	0.000
Linear-by-Linear Association	36.592	1	0.000
N of Valid Cases	390		

4.6.3 Accessibility and use of ICTs for economic development

Table 10 indicates that all respondents with 50% accessibility used ICT for economic development to an extent of 45%. Ninety three percent (93%) of those who had no access to ICT tools had not used ICT for economic development in preceding 12 months.

Table 10: cross tabulation between accessibility and use of ICT for economic development

Accessibility	To what extent (%) were ICTs used in the last 12 months for participation for in economic development?							Total
	0%	9%	18%	27%	36%	45%	54%	
0%	93.80%	0.00%	0.00%	4.20%	0.00%	0.00%	2.10%	100.00%
12.50%	16.70%	0.00%	16.70%	16.70%	33.30%	0.00%	16.70%	100.00%
25%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	50.00%	100.00%
37.50%	0.00%	20.00%	40.00%	20.00%	0.00%	0.00%	20.00%	100.00%
50%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	100.00%
Total	69.40%	20.80%	2.30%	2.30%	2.30%	1.30%	1.50%	100.00%

Table 11 indicates that there was a significant association between accessibility and use for ICT for economic development ($\chi^2 = 252.994$; $p < 0.05$).

Table 11: Association between accessibility and use of ICT for economic development

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	252.994	30	0.000
Likelihood Ratio	99.889	30	0.000
Linear-by-Linear Association	45.063	1	0.000
N of Valid Cases	389		

4.7 Conceptual Model

In conducting the study, a conceptual framework was used to show the relationship between the independent variable and dependent variables. In the study the independent variable is defined as access to ICTs tools which is accessibility while the dependent variables are women participation in economic, political and social development. Since the outcome is dichotomous, logistic regression was performed.

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k \dots\dots\dots(1)$$

Where p is the probability of presence of the characteristic of interest. The logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1 - p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}} \dots\dots\dots(2)$$

And

$$\text{logit}(p) = \ln\left(\frac{p}{1 - p}\right) \dots\dots\dots(3)$$

Table 12: Significance of Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp (B)
Accessibility	- 3.517	.708	24.676	1	.000	.030
Age (18-25)			1.218	2	.544	
Age(1)	-.165	.691	.057	1	.811	.848
Age(2)	-.532	.652	.667	1	.414	.587
Educ (Primary)			10.601	2	.005	
Educ(Secondary)	- 3.657	1.126	10.551	1	.001	.026
Educ(Tertiary)	- 0.949	.546	3.020	1	.082	.387
Labour(1)	- 0.456	.432	1.116	1	.291	.634
Constant	3.597	1.235	8.487	1	.004	36.489

a. Variable(s) entered: Accessibility, Age, Education, Labour.

The estimates in Table 12 indicate the relationship between the independent variables and the dependent variable, where the dependent variable is on the logit scale. Access to ICT by women was also significant in explaining use of ICT in development ($p < 0.05$). The results indicated that increase in accessibility of ICT would reduce the log odds for application of ICT in development by women by 3.517 ($B = -3.517$; $\text{Exp}(B) = 0.30$). These results imply that increasing accessibility to ICT would reduce the log of the odds of increase in use of ICT for development by 3.517.

In regard to accessibility, for every one-unit increase in accessibility score, there is expected marginal decrease in women participation by about 0.03 times in the social, political and economic development through ICTs, holding all other independent variables constant ($B = -3.517$; $\text{Exp}(B) = .030$).

V. CONCLUSION

Access to ICTs by women was significant in explaining their use of ICTs in participation in development. However, the results indicated that increase in accessibility of ICT marginally reduced women's use of ICTs for participation in development. Lastly, affordability of ICT was not a significant predictor of use of ICT for participation in development by women.

The study has the following implications. First, the study agreed with the findings of the ICT policy of Kenya of 2006 that engendering ICT policies at all levels and ensuring participation of women in ICT policy formulation and implementation is a key challenge of ICT in national development. Further, government and other stakeholders should promote use of ICT in the rural areas through promoting infrastructure projects in support of ICT. Similarly, women should be encouraged to participate more in learning how to use ICT tools to increase their efficacy.

Finally, for purposes of adding academic knowledge and shed more light in this study area, it is recommended a qualitative study be undertaken to explore influence of access to ICT tools for political, social and economic development.

REFERENCES

- [1] United Nations Commission on Status of Women (2003), Gender Working Group Paper. Canada. International Development Research Centre
- [2] UNDP Kenya (2013). Kenyan women lag in Political Representation retrieved November 12th 2013 from <http://www.ke.undp.org/index.php/news/2013/08/kenyan-women-lag-in-political-representation>.
- [3] Primo, N. (2003). Gender Issues in the Information Society. Park Avenue South. New York, USA: Basic Books Publishers.
- [4] United Nations (2005). Global E-Government Readiness Report 2005 from E-Government to E-Inclusion. United Nations Division for Public Administration and Development Management. Retrieved July 20, 2013, from <http://ec.europa.eu/idabc/servlets/Doc?id=23829>.
- [5] Gillwald, A. & Deen-Swarray, M (2013). Lifting the gender veil on ICT Statistics in Africa. WSIS Forum 2013: Measuring ICT and Gender. Retrieved on 30 May, 2013 from ResearchICTAfrica.net
- [6] Gurumurthy, A. & Chami, N. (2014). Gender Equality in the Information Society. London: DFID.

- [7] Plo, D.S (2012). Women and ICT policies: The commitment to take on new debates and challenges. In Randhpawa, S. (Ed), critically absent: Women's rights in internet governance, UK. Published by Mallory Knodel and Flavia Fascendini.
- [8] GSM (2006). A Development Fund 2006 annual report. Retrieved November 12th, 2012, from <http://www.gsma.com/mobilefordevelopment/>
- [9] Doria, A. (2012). Internet governance and gender issues In Randhawa, S. (Ed), critically absent: Women's rights in internet governance, UK. Published by Mallory Knodel and Flavia Fascendini.
- [10] Burbules, N. C., & Callister Jr, T. A. (2000). Watch IT: The Risks and Promises of Information Technologies for Education. 5500 Central Avenue: Westview Press.
- [11] Checkland, P. (1981). Systems Thinking, Systems Practice, and London: John Wiley & Sons.
- [12] Goodhue, A., Dale, L.Thompson, D. & Ronald L. (1995). Task-technology fit and individual performance, MIS Quarterly, 19, 2(pp 213-236)
- [13] Pedersen, P.E. (2003). Adoption of mobile internet services: An exploratory study of mobile commerce early adopters. Retrieved July11, 2005 from http://ikt.hia.no/perep/earlyadopt_paper.pdf
- [14] Van Akkeren J. and Harker, D., (2003). The mobile Internet and small business: An exploratory study of needs, use and adoption with full-adopters of technology. Journal of Research and Practice in InformationTechnology, 35(3), 205-220.
- [15] Sreedevi, M. & Reddy, R. N. (2012). ICT for Women Empowerment – A Case Study of developing Countries. Retrieved November 12th, 2012, from http://www2007.org/workshops/paper_106.pdf
- [16] ICT Regulation Toolkit. (2009). ICTs and Generations – Constantly Connected Social Lives. In COST: The Good, the Bad and the Challenging, Copenhagen, Denmark.
- [17] Van Dijk, J. (1999). The Network Society, Social aspects of the new media. London, Thousand Oaks, New Delhi: Sage Publications.
- [18] Bridges. (2001). Spanning the Digital Divide: Understanding and tackling the issues. Retrieved on 26 July 2013 from <http://www.bridges.org>.
- [19] Putnam, R. (1993). Making Democracy Work. Princeton: Princeton University Press.
- [20] Karan, K., and Raj Mathur, R. (2010). Women Forge Ahead: Internet and E-Governance E-Seva in Andhra Pradesh, India. Journal of Community Informatics 6(3).
- [21] Jahja, N. (2013) .Transformation of Social Roles through ICTs for Rural Women. In APC and Hivos (Eds), Claiming Women's Economic, Social and Cultural Rights: A Resource Guide to Advancing Women's Economic, Social and Cultural Rights.
- [22] Bossio, J. and Bossio, J.F. (2013). Women against Violence: Using the Internet as a Tool for Collaboration and Advocacy. In APC and Hivos (Eds.) , Claiming Women's Economic, Social and Cultural Rights: A Resource Guide to Advancing Women's Economic, Social and Cultural Rights.
- [23] Mudavanhu, S. and Radloff, J. (2013). Taking Feminist Activism Online: Reflections on the Keep Saartjie Baartman Centre Open E-Campaign'. Gender & Development 21(2): 327-341.
- [24] Nielsen, S., von Hellens, L., Greenhill, A. & Pringle, R. (1998). Conceptualizing the influence of cultural and gender factors on students' perceptions of IT studies and careers. In Proceedings of the 1998 ACM SIGCPR Computer Personnel Research Conference, Boston (pp.86-95).
- [25] Tapia, A.H. (2003). Hostile_work_environment.com. In E. Trauth (Ed.), Proceedings of the ACMSIGMIS Computer

- Personnel Research Conference (pp.64-67).New York: ACM Press.
- [26] Trauth, E. M. (2002). Odd girl out: An individual differences perspective on women in the IT profession [Special Issue on Gender and Information Systems].*Information Technology and People*, 15(2), 98-118.
- [27] Trauth, E.M., Quesenberry, J.L., &Morgan, A. J. (2004, April22-24).Understanding the underrepresentation of women in IT: Toward a theory of individual differences. In M.Tanniru & S.Weisband (Eds.), *Proceedings of the2004ACMSIGMIS Conference on Computer Personal Research*, Tuscon, AZ (pp.114-119).New York: ACM Press.
- [28] Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital Divide*: The MIT Press, Massachusetts.
- [29] Adam, A. (2002). Exploring the gender question in critical information systems. *Journal of Information Technology*, 17, 59-67.
- [30] Doolin, B. (1998). Information technology as disciplinary technology: Being critical in interpretive research on information systems [Special Issue on Interpretive Research in Information System].*Journal of Information Technology*, 13(4), 301-312.
- [31] Kling, R. (2000). Learning about information technologies and social change: the contribution of social informatics, *The Information Society*, (Vol. 16, pp. 217-232)
- [32] Loader, B. D. & Keeble, L. (2004). *Challenging the Digital Divide? A Literature Review of Community Informatics Initiatives*. USA. Joseph Rowntree Foundation, Teesside University.
- [33] Taylor, W. (2004): *Community informatics in perspective*, in "Using Community Informatics to Transform Regions", S.Marshall, W.Taylor &X.H.Yu (Eds), Idea Group Publishing, Hershey, PA., (pp. 1–17).
- [34] Schuler, D. (1996): *New Community Networks: Wired for Change*, Addison –Wesley Publishing Company, retrieved 4 October, 2007from: <http://www.scn.org/civic/ncn/>
- [35] Gurstein, M. (2002). *Community informatics: current status and future prospects - some thoughts*, *Community Technology Review*, Winter–Spring, retrieved 14 February 2010 from http://www.comtechreview.org/article.php?article_id=56
- [36] Chua, J. (2013). ICTs and the Fight against Female Genital Mutilation in Iraq. In APC and Hivos (eds). *Claiming Women’s Economic, Social and Cultural Rights: A Resource Guide to Advancing Women’s Economic, Social and Cultural Rights*.
- [37] Government of the Republic of Kenya (2011). Ministry of State for Planning, National Development and Vision 2030. Government of Kenya.
- [38] Gallivan, M. (2003).Examining gender differences. In E. Trauth (Ed.), *Proceedings of the ACM SIGMIS Computer Personnel Research Conference* (pp.10-23).New York: ACM Press.
- [39] Igbaria, M., &Baroudi, J. J. (1995). The impact of job performance evaluations on career development prospects: An examination of gender differences in the IS workplace. *MIS Quarterly*,19, 107-123.
- [40] Igbaria, M., &Chidambaram, M. (1997). The impact of gender on career success of information systems professionals. *Information Technology &People*, 10(1), 63-86.
- [41] Venkatesh, V., & Morris, M. (2000). Why don’t men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24(1), 115-139.
- [42] Dunn, L. and Dunn, H. (2013). Women’s Rights, Gender and ICTs: Empowering Household Workers in Jamaica, in APC and Hivos (eds), *Claiming Women’s Economic, Social and Cultural Rights: A Resource Guide to Advancing Women’s Economic, Social and Cultural Rights*.
- [43] Antonio, A. and Tuffley, D. (2014) .*The Gender Digital Divide in Developing Countries*. *Future Internet* 6: 673-687.
- [44] Domingo, P., Holmes, R., O’Neil, T., Jones, N., Bird, K., Larson, A., Presler-Marshall, E. and Valters, C. (2015) .*Women’s Voice and Leadership in Decision-Making: A Review of the Literature*.
- [45] Khasiani, S.A (2000). *Enhancing Women Participation in Governance: The Case of Kakamega and Makueni Districts, Kenya*. In Rathgeber, E. & Adera, E.O (Eds.) *Gender and the Information Revolution in Africa* (pp.215- 237) Canada: International Development Research Center.
- [46] Nzomo, M., (2012). *Women in political leadership in Kenya: access, agenda setting & accountability*. Institute of Diplomacy & International Studies, University of Nairobi.
- [47] Kothari, C.R. (2006). *Research Methodology: Methods and techniques*. Bangalore: New Age International Publishers.
- [48] Chandran, C. (2004). *Research Methods. A quantitative approach*. Nairobi: Daystar University.
- [49] Sekeran, U. (2003). *Research Methods for Business: A Skill Building Approach* (4th Ed.). New York: John Willy and Sons Inc.
- [50] Kenya National Bureau of Statistics: *Kenya 2009 Population and Housing Census Highlights*. Nairobi, Kenya: Kenya National Bureau of Statistics; 2010.