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Angela Mucece Kithinji

University of Nairobi, Kenya.

The Control Effect of Economic Growth on the Relationship Between Information Communication Technology and Poverty Reduction in Kenya

Angela Mucece Kithinji

Abstract

This study sought to examine the role of ICT in poverty reduction in the Kenyan economy. The study was quantitative in nature and used Ordinary Least Squares Regression technique. Data from International Telecommunication Union, UNDP and World Bank from 1992-2020 were used in the study. ICT was measured using mobile phone subscriptions while poverty was measured using HDI. The findings were that ICT had a positive impact on poverty reduction and this affirms the assertion that ICT is useful for poverty reduction. When economic growth was introduced as a control variable it was found that only economic growth had a significant effect on poverty reduction while ICT became insignificant in influencing poverty reduction. In terms of policy recommendation, it was suggested that the Kenyan government should ensure that sound and robust ICT policies are crafted that promote an increase in the usage of ICT as well as enabling both the private and public sector companies to take part in all economic activities that enhances ICT usage and ultimately improve the living standards of people of Kenya.

Keywords: information and communication technology, poverty reduction, gross domestic product, mobile phone usage, human development index.

Introduction

Information and Communication Technology (ICT) plays a major role in all aspects of national life: in politics, in economic life, as well as in social and cultural development. It is rapidly transforming lives, the way business is done, access to information and services, communication with each other and entertainment. ICT also affects human rights, helping, at best, to support freedom of expression and right to information according to the Article 19 of the Universal Declaration of Human Rights (Beegle, 2016; World Bank, 2015). In 1998 OECD member countries agreed to define the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically (OECD, 2002). The important factor in this broad definition is that, as it breaks the traditional dichotomy between manufacturing and services, activities producing and distributing ICT products can be found everywhere in the economy. The definition, thus, paves way for understanding the multi-dimensionality of the ICT and its applicability in helping to reduce poverty across various sectors (Oladimeji and Folayan, 2018).

The role of the ICT in the so-called digital divide has been hotly debated: Whether it exists and if it exists is it narrowing? What is its relationship to poverty and does it reinforce existing divisions between the rich and the poor? No one can deny the fact that the digital divide exists, although there has been progress in reducing some of the gaps. Judging by the ratio of Internet hosts and users in the regions, Africa is still lagging behind other regions. According to the regional statistics on mobile penetration there are also links between the digital divide and the human development indicators such as the commonly used human development index (HDI). According to Flor (2001), this is the case with South-East Asia regarding the literacy levels. UNDP's human poverty index reveals that the higher the human poverty index, the lower the number of Internet Service Providers (ISPs), telephone lines, Personal Computers (PCs) and Television (TV) sets per 1000 persons. The higher the value

Correspondence:

Angela Mucece Kithinji

University of Nairobi, Kenya.

of ICT indicators (as in the case of Singapore, Brunei and Malaysia), the lower the poverty rank. By providing cheap and efficient tools for the exchange of the information, ideas and knowledge ICT can become an enabling tool for wider socio-economic development. When properly used, it can greatly increase the ability of the poor people to benefit from economic development and from development programs meant to help them (Olawale, 2018; Oladimeji and Folayan, 2018). A digital divide also exists within countries: between economically more and less-developed regions, between urban and rural areas, between poor and the well to do, between the educated and the illiterates, between men and women, and between the young and the old. There also exists a divide between a majority population and indigenous ethnic minorities, which have traditionally been excluded from almost all development. According to International Telecommunication Union (ITU) the digital divide is as a result of socio-economic disparities, and thus it is little different from other income, health and education divides, linked to poverty. The digital divide, therefore, is often just a symptom of a much more profound and longstanding economic and social division within and between societies, and which existed prior to the ICT revolution (Adams, 2002; Warschauer, 2002).

There is also a digital divide between sectors. In Thailand and the Philippines, the business sector is fast catching up with its counterparts in Singapore, but the educational sector is lagging far behind. At the tail end of the ICT utilization spectrum are the agricultural and rural development sectors, with the least number of ICT users, applications and solutions, and with most of 'the information poor' (Flor, 2001). At the same time the nature of divide is shifting from basic to advanced communications, and from quantity to quality (ITU, 2002). Many countries, alarmed about the digital divide, have started to address the problem and are making progress in narrowing some of the divisions and gaps. In November 2002 India added more mobile phone customers than ever before, bringing the total number of mobile users to almost 10 million. Although it has some of the lowest mobile phone prices in the world, only one in 100 Indians was said to use a mobile phone, whereas in China it was one in seven. Access to Internet in China has grown exponentially since the country established its first connection in 1993 (Kalathil and Boas 2001). Increasingly, ICT is being used as a tool of development. Among the developing countries at least India, Jamaica and South Africa have given a high priority to policies aimed at promoting the use of ICTs. But what then is the relationship with and the effect of ICT on poverty reduction?

Poverty can be defined as the complete absence of opportunities, coupled with high levels of undernourishment, hunger, illiteracy levels, lack of access to education, physical and mental diseases and socio-economic instability (Beegle, 2016). Poverty is a multidimensional aspect and can be defined using diverse proxies such as access to nutritious food, shelter, water and sanitation, peace, access to education and healthcare just to mention a few (Agboola and Balcilar 2012). The Classical theory of poverty is built on the assumption that markets operate efficiently and individual productivity is directly correlated to the wages earned (Davis and Sanchez-Martinez, 2014). However, the Classical theory acknowledges that poverty can be caused by the pure

heterogeneity in genetic abilities in people. The Classical theory also assumes that government intervention is necessary when poverty levels increase. If this theory holds water, then why is Kenya failing to curb the high levels of poverty? In reality Sub-Saharan Africa governments have continuously showed efforts in solving poverty though it is far from sufficient (World Bank, 2015). Extreme poverty, experienced by about 1.2 billion people is considered by many to be the worst human right violation in the world. Consequently, the global development community had endorsed in the Millennium Development Goals its commitment to halving the number of people living under one dollar a day by 2015 (Beegle, 2016) the outcome of which is yet to be realised.

Poor people are often unaware of their rights, entitlements and the availability of various government schemes and extension services. Often the poor know their problems, but they lack knowledge of the wider socio-economic context of their poverty. They also lack information on various solutions to improve their situations (Ochanja, 2017). Poverty stems from situations where gross inequality in the ownership of assets persists because of vested interests and entrenched power structures. Markets can provoke collusions that block the potential benefits of competition to the poor and the disadvantaged easily fall outside distributional coalitions. Market, thus, can be biased in favor of the more affluent and powerful social groups and against poor and disadvantaged groups (Leyshon and Thrift, 1997). Even under otherwise ideal market conditions, the poor may end up paying more and earning less, and face a number of constraints to an extent not experienced by others (Bowles 1999). At the national as well as local levels economic gains may be captured by elites who may form patronage and clientele networks for the redistribution of benefits. The lack of good governance, together with inadequate legislation or its inadequate enforcement may further reinforce such capture (Beegle, 2016). Poor people often lack essential assets such as good productive resources and capital. Their employment situation is insecure and fragile, and their incomes seasonal and meager. They live in remote, unhygienic and resource-poor areas, in distant villages and in appalling slums. Their poverty results from lack of incomes, poor health and lack of education, lack of social safety nets, and discrimination (Besley and Cord (eds.), (2007). They also lack information, and suffer from poor government services and corruption. Assistance may also not reach them because of the lack of political will, poor governance and corruption, and inappropriate public policies and programs (World Bank 2020). Good governance facilitates pro-poor policies as well as sound macroeconomic management. Public sector inefficiency, corruption, and waste leave insufficient resources to support public services and anti-poverty programs (Asian Development Bank, 2002).

The lack of systematic and transparent recording and public documentation of government data that the poor need has a negative effect on development outcomes. As documented by Hernando de Soto (2000), even if the poor have lands, without records the capital is 'dead'. Without land records as collateral, they cannot apply for loans, and often they cannot get assistance from government poverty alleviation programs intended for small farmers (Warschauer, 2003). For the poor, getting access to even the most common type of government information or documentation can be a

nightmare requiring multiple visits, waste of time and bribes. Poverty, thus, is a highly complex socio-economic problem, that needs to be tackled concurrently in various sectors in order to untangle the 'Gordian knot' of poverty (Sledzik, 2013).

The effect of ICT on poverty is contentious. There are two opposing "opinion camps": those that consider ICT to be the panacea for poverty reduction and those that claim that ICT has no reasonable role in poverty reduction as long as the basic needs of the poor are not met. It is argued that ICT, if supported with the right policies and with cross-cutting and holistic approaches, will complement and strengthen other multisectoral efforts that are required for poverty reduction, including those meeting the basic needs (Ochanja, 2017). Through infokiosks or even with the help of mobile phones farmers can access information on market prices or on extension services. Workers can get information on available jobs and minimum wages. ICT interventions, however, can only be successful when accompanied by other supporting infrastructure such as access roads, storage facilities and competitive markets, including the global market. The 'Gyandoot' community network, aimed at creating a cost effective, replicable, economically self-reliant model for taking benefits of Information Technology to the rural population, is an intranet network using Wireless in Local Loop (WLL) technology to set up in 5 blocks with 21 kiosks, each catering to about 15-20 villages in tribal Dhar district in Madhya Pradesh in India. ICT technologies can be used to increase efficiency, competitiveness and market access for developing country firms. An InfoDev-sponsored organization called People Ink, for example, has established an e-commerce programme allowing local artisans in developing countries to bypass middlemen and market their products directly to first world customers.

ICT can play a major role in enhancing the activities of the poor and increasing their productivity. It can help to increase access to market information or lower transaction costs of poor farmers and traders. ICTs can boost access to many other services such as rates of agriculture produce, land record rights, computer training, caste certificates, online public grievance redressal, health services, e-mail, rural e-auction, matrimonial alliances, information on government programmes, information for children, online employment exchange, availability of applications for jobs, local weather report and e-newspapers among others (Samiullah and Rao, 2002). Women being particularly disadvantaged, when it comes to access for rural extension services, and technical, agricultural and market information because of their low educational status and high illiteracy incapacitates them from benefiting from and tapping new information and improved practices. They also lack a socially accepted decision-making in production while agricultural and other field-based extension officers, who are usually men, mainly consult other men. By tradition women are less mobile, more culturally constrained and often too overburdened with various chores to be able to participate in technical trainings (Kelles-Viitanen, 1997; World Bank, 2001). Women can thus significantly benefit from ICT and leverage on it and by extension contribute significantly to poverty reduction.

ICT can also play a major role in helping to monitor food security related issues (weather, droughts, crop failures and pests among others), and to inform government on

impending food scarcities and famines. There are many success examples of the role of the ICTs in promoting education of the poor. In Brazil's urban slums an ICT facilitated educational program not only improved the skills of the poor and the employability of the youth, but it also in many ways transformed their lives. In Brazil's urban slums, the Committee to Democratise Information Technology (CDI) has created 110 sustainable and self-managed community-based "Computer Science and Citizenship Schools," using recycled technology, volunteer assistance, and very limited funds (World Bank, 2015). ICT can facilitate speedy, transparent, accountable, efficient and effective interaction between the public, citizens, business and other agencies. This not only promotes better administration and better business environment, but also saves money in costs of transactions in government operations (IICD, 2001).

ICT can be used to get rid of such malpractices of poor governance and to speed processing of documents in public offices. In Andhra Pradesh, India, networked computers have been used in the reform of processes to register deeds and stamp duties. Using traditional methods, this took 13 cumbersome steps in a highly opaque process that invited bureaucratic delay and corruption. In Andhra Pradesh, a program to computerize the issuance of caste certificates, essential for obtaining government service vacancies and access to educational scholarships, managed to decrease the time for certificate issuance from 20 to 30 days to only 10 minutes (World Bank, 2001). Citizen feedback to government provides a check on bureaucratic abuse and corruption, alerts the government to citizen's needs and concerns, and gives citizens a sense of having a voice in society. ICT interventions on governance, therefore, need to be accompanied with legislative reforms (World Bank, 2001). Cyber legislation is also required to safeguard the privacy of citizens and to support paperless administration. Other institutional reforms are required to address bureaucratic resistance and to increase the commitment to openness and transparency. At the same time capable institutions with effective policy frameworks and clear operating systems are required for smooth functioning of ICT based development.

The various success cases, as described above, are possible only if the ICT infrastructure and an enabling policy environment have been put in place. It has been proposed that strong linkages need to be established between direct ICT interventions and national-level programs that deploy ICT as an enabler in development. At the same time a strategic compact need to be built upon old and new partnerships to redefine roles and responsibilities at the global, national and local levels. The global networked economy demonstrates that development strategies can no longer be pursued in isolation, but must be pursued within the global context, while simultaneously addressing the needs and opportunities emerging from the local context (David and Moses, 2016).

An enabling regulatory and policy environment is required for the ICT sector, including coherent national plans, that integrate ICT-based development. They should help to build national and regional Internet backbones and community access points; adopt enabling policies for telecommunications and electronic commerce; encourage the creation and dissemination of locally relevant content and applications that fit with the cultural and social context,

reflecting the linguistic diversity; significantly expand education and training programs, both in general and with regard to ICT in particular; and help to create a facilitative environment and access to ICT for the civil society, private sector and government (Drake, 2001). ICT policy also needs to address connectivity, ICT governance, privacy, security, intellectual property, and resource mobilisation. Although each country would need to tailor a strategy best suited for its conditions, there are, according to the World Bank, also common principles that need to be included, such as effective separation of policy and regulatory functions (World Bank, 2015).

Hardware too could be developed in close consultation with the poor, and in line with the developing country conditions, responding to various constraints such as lack of main energy supply or interrupted supply. Techniques such as voice mail translation of content, and icon-based telephones could be used. Such research and development already exist in developing countries. India and Indonesia are developing their own customized, low-cost IT terminals and devices. The Indian Institute of Science has invented an inexpensive Simputer, based on the Linux operating system to provide Internet and email access in local languages and with touch-screen functions. Future versions will have speech recognition and text-to-speech software for illiterate users. India, Brazil, Thailand and Niger have also developed software for illiterate users (UNDP, 2001). According to the World Bank (2001) 81 percent of telecommunications investments in projects with private participation went to just ten developing countries in 1998, 52 percent of the investments were in Latin America, while less than 3 percent were in Sub-Saharan Africa during 1990-98.

What is the position when it comes to economic growth and its role in poverty reduction? Igwe, Onjewu and Uguru (2018) observe that the relationship between growth and poverty is rather complex, and depends largely on the existing inequalities (such as illiteracy and land ownership) and initial conditions that favour or discourage the distributional effects of growth. Both cross-country research and country case studies provide overwhelming evidence that rapid and sustained growth is critical to making faster progress towards the Millennium Development Goals – and not just the first goal of halving the global proportion of people living on less than \$1 a day (Birdsall, 2002). But ultimately the biggest determinants of growth in a country will be its leadership, policies and institutions. In particular, the countries that are caught in an “institutional poverty trap” will not necessarily benefit from a healthy regional and global market (Thoburn and Jones, 2002; Wider, 2001). Economic growth is necessary but not sufficient when it comes to poverty reduction. A successful strategy of poverty reduction must have at its core measures to promote rapid and sustained economic growth. The challenge for policy is to combine growth-promoting policies with policies that allow the poor to participate fully in the opportunities unleashed and so contribute to the desired economic growth (Oladimeji and Folayan, 2018). If poor people do not have access to basic education, how will they take advantage of employment and income opportunities created by economic growth? If there is discrimination and social exclusion, how will the discriminated and excluded people take advantage of the expanded economic activities and share the benefits of the

economic growth?

Ochanja (2017) examined the role of ICT in poverty reduction in Nigeria and found out that Nigerian government failed to reduce poverty from 1960 due to non-inclusion of ICT as a strategic tool. However, the use of ICT has proved to be useful in poverty reduction in Nigeria though it is on a smaller scale. Apart from that, research findings unearthed that ICT can have a projected 50% positive effect in reducing poverty. Oladimeji and Folayan (2018) researched on ICT and its effects on development in Nigeria and unearthed that Nigeria’s level of online business was very low, as such more ICT implementation was needed especially in rural areas. The development of rural areas especially in areas of health sector, educational, agriculture and politics can have major breakthroughs in reducing poverty. Gholami, Sang-Vong Tom and Heshmati (2005) did research and established that, ICT has an indirect effect on economic growth. This shows that, the more the ICT used in an economy, the higher the gross domestic product (GDP) attained *ceteris paribus*. These results tally with the views of Latif (2018) who posited that ICT positively affects economic growth. From this perspective, high GDP levels often come with high expansionary economic activities as well as employment prospects.

Problem Statement

The role of ICT is catalytic in the complex task of poverty reduction by leveraging the effects on earnings opportunities, on educational and health services, on good governance and on promoting democracy. Since information exchange is part of nearly every element of the economy, the impact of improvements in the capacity for information exchange will depend critically on how the rest of the economy functions. This suggests the centrality of a holistic approach in evaluating the impact of ICT on poverty reduction (World Bank, 2001). An economy needs to be experiencing economic development for the citizens to leverage on the benefits of ICT since ICT can be used as a catalyst of compounding economic activities which can easily be extended through technology.

The Kenyan economy is one of the richest economies in the African region but large proportions of the entire population are poor. Economies in the global village especially Singapore tend to benefit from the use of ICT in poverty alleviation, but for the Kenyan economy the gains from ICT in as far as reduction of poverty is concerned are still to be realised. What can be done to ensure that ICT is used as a tool for reducing poverty in Kenya? With the upcoming extensive usage of mobile phones in Kenya how can the Kenyan economy leverage on the usage of mobile phones and other ICT services to reduce the number of Kenyans living on less than \$1 a day? Theoretically there are four key features that are circular flow, role of entrepreneur, end of capitalism and cyclical process (Englmann, 1994) which are important in poverty reduction (Bodrožić and Adler 2018). Thus, new technology channelled towards the production of goods and services can be beneficial in increasing the economic growth and economic development of any economy and thus reduce poverty levels. ICT enables mass production of goods and services which are expected to lead to increased economic growth. Apart from that, supposedly, business expand due to innovation, there will be demand for more labour which

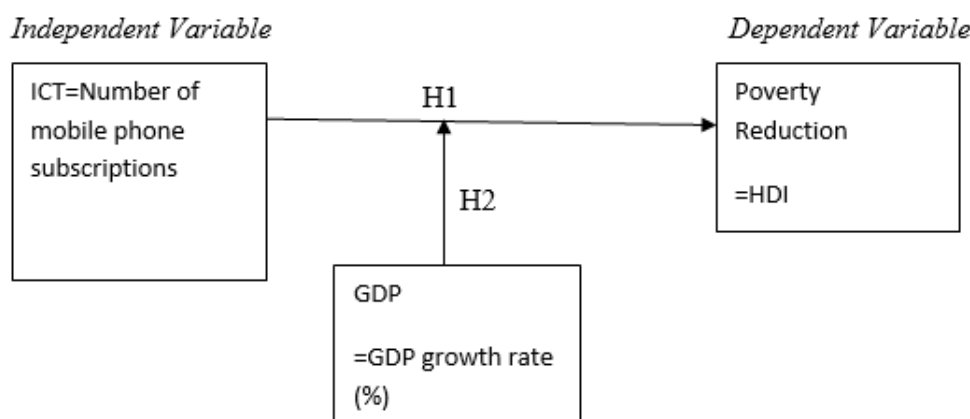
would then increase employment and also increase the levels of income thus reducing poverty. Empirically, there is need for technology diffusion by diverse corporate players such as SMEs, entrepreneurs among others in the Kenya to reduce poverty levels. Kenya can reduce its poverty levels provided ICT is channelled towards productive sectors and even entrepreneurs. This in the long-run will help in job creation and uplifting of living standards. Given the two arguments on the role of ICT on poverty reduction; that ICT may or may not reduce poverty levels this study seeks to determine whether ICT can be used as a tool for poverty reduction and by extension establishes whether economic growth considered together with ICT reduces poverty in Kenya.

Research Objectives

1. To determine the effect of ICT on poverty reduction in the Kenya.
2. To establish the control effect of economic growth on the relationship between ICT and poverty reduction in Kenya

Conceptual Framework

The interrelationships between the study variables is discussed below. Increased usage of ICT in form of mobile phones is expected to reduce poverty. When the economy experiences economic growth poverty levels reduces. An increase in ICT usage through increased use of mobile phones improves performance of businesses, improves efficiency, leads to information availability and increases economic growth through increased GDP which leads to poverty reduction.



Hypothesis

H₀₁: There is no significant effect of ICT on poverty reduction in Kenya.
 H₀₂: There is no control effect of GDP on the effect of ICT on poverty reduction in Kenya

Materials and Methods

This section presents the research methodology used in the study. A brief description of the variables used will be presented as well as the hypothesis.

Table 1: Summary of Data Set.

Variable	Indicator	Variable Description	Unit of measurement	Source of Data
HDI	Human development Index	Proxy for poverty measurement	Index	United Nations 2021
ICT	Mobile phones	Proxy for ICT usage	Ratio	Author Computation based on International Telecommunication Union (2021)
GDP	GDP growth rate	Measure for GDP	Ratio	KNBS (2021)

Source: Researcher’s Construct

Data was collected from international published documents. Data on HDI was obtained from United Nations Development Programme (UNDP)(2021), data on ICT was obtained from International Communication Union (2021) and data on GDP was obtained from the Kenya National Bureau of Statistic and Economic Surveys (1992 to 2021). Descriptive statistics to measure central tendency dispersion were estimated and regression analysis performed on the data.

Model Specification

Two regression models were fitted on the data. The first regression model estimated the effect of ICT on poverty reduction while the second regression estimated the control effect of economic growth on the relationship between ICT and poverty reduction in Kenya. The model is specified below.

$$y^t = m + \beta_1 x^t + uit \dots \dots \dots 1$$

Where y^t represent poverty and x^t represents the stationary variable which is ICT, β_1 represents the coefficient, m is the constant and uit is white noise. ICT was measured using mobile phone usage and poverty was measured using HDI.

A second regression was estimated incorporating a control variable which in this case was economic growth which was measured using GDP growth rate as an influence on the relationship between ICT and poverty reduction.

$$y^t = m + \beta_1 x^t_1 + \beta_2 x^t_2 + uit \dots \dots \dots 2$$

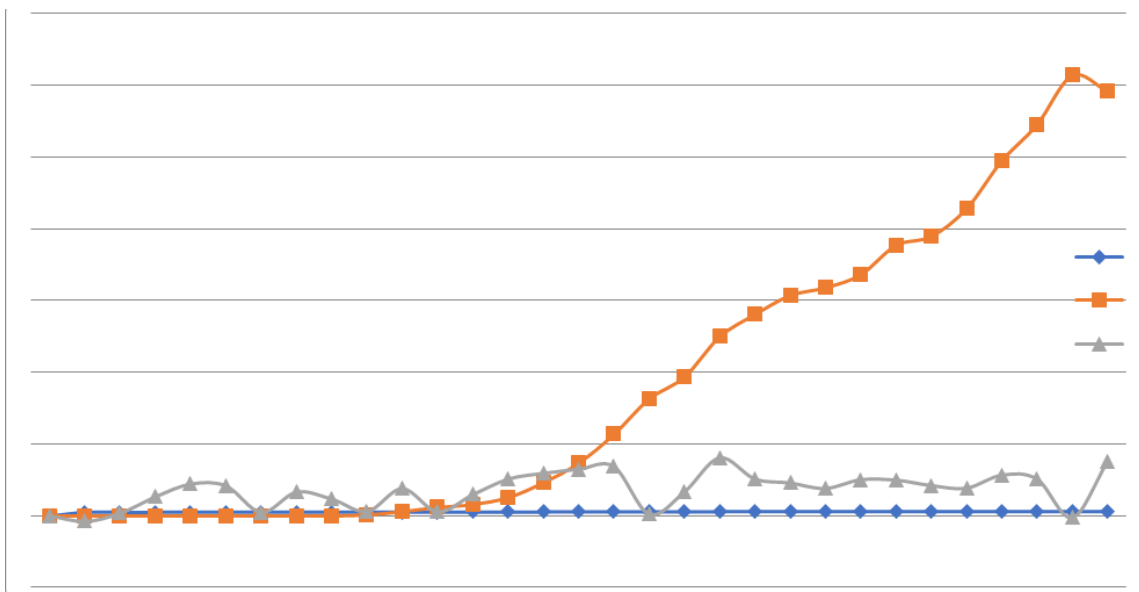
Where y^t represent poverty and x^t_i represents the stationary variables which are ICT and GDP growth rate, β_i

represents the coefficients, m is the constant and uit is white noise.

Data Analysis and Interpretation of the Results
Trend analysis of Poverty, ICT and Economic Growth

Graph 1 below portrays the trend analysis of poverty (as measured using HDI in green) and ICT (as measured using mobile phone subscriptions in red) are displayed below. Additionally, the graph also shows the pattern of economic growth (in blue) for the period 1992 to 2002.

Graph 1: Trend Analysis of Poverty and ICT and Economic Growth.

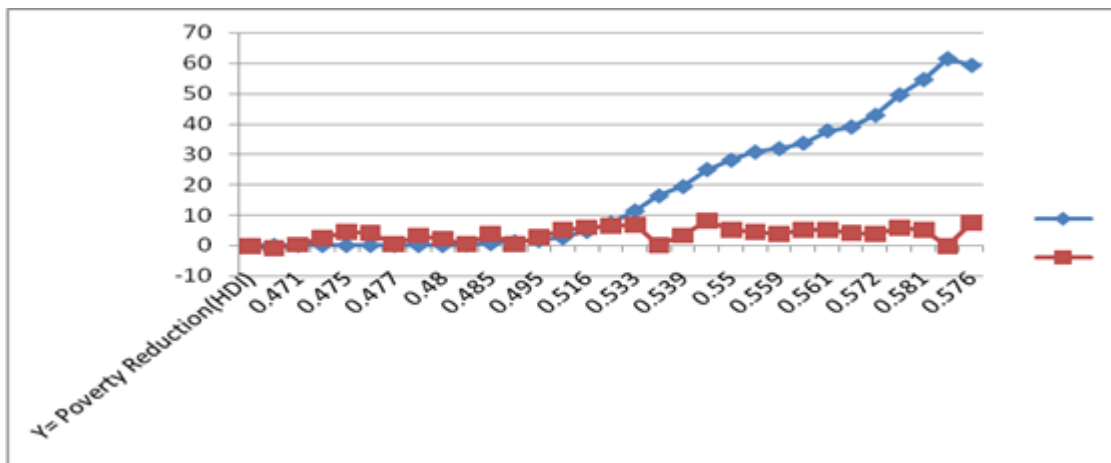


Source: Researcher, 2022, ITU, UNDP, Economic Surveys

Graph 1 shows that from 1992 to 2021 ICT usage increased. It however appears that from 1992 to 2000 the ICT as measured using mobile subscriptions was low but increased rapidly between 2002 to 2020 and decreased slightly in the year 2021. The poverty levels increased and decreased during the study period and was high in 1995 and

1996, then 1998, then 2001 and also increased between 2004 to 2008, 2010 and further increased between 2014 to 2019. Poverty levels were lowest in 1992 and 1993, 1997, 2000, 2002, 2008 and 2020. Relative to ICT and Poverty economic growth was lowest and fairly moderate during the period 1992 to 2021.

Graph 2: Relationships Between Poverty and ICT and Economic Growth.



Source: Researcher, 2022, ITU, UNDP and Economic Surveys

Graph 2 shows that increases in poverty levels were found to mimic increased ICT usage. The Y-axis is the poverty while the X-axis is ICT usage (in blue) and economic growth (in red). The graph shows that below poverty levels of 0.495 are also low ICT usage as few mobile phone subscriptions were registered then. An interesting observation is that the higher the ICT usage as measured using mobile phone subscriptions the higher the poverty

levels which is contrary to the expectation. Another observation is that while economic growth fluctuated being high when poverty index was 0.475, 0.533, 0.54 and 0.576. The GDP growth rate was low at poverty levels of below 0.533 and was also low at poverty levels above 0.539.

Descriptive Statistics

Table 1: Descriptive Statistics on Poverty and ICT and Economic Growth.

Table 1: Descriptive Statistics						
Variable	Min	Max	Mean	StdDev	Skewness	Kurtosis
Y=HDI	0.471	0.581	0.523	0.0397	0.0729	-1.65
X1=ICT	0	61.41	18.62	19.58	0.791	-0.665
X2=EcGrt	-0.8	8.06	3.672	0.2304	-0.28828	-0.6465

Source: Researcher 2022

The descriptive statistics reveal that minimum poverty level was 0.471 and the maximum poverty level was 0.581 while the mean level of poverty level was 0.523 with a standard deviation of 0.0397. ICT usage data revealed a minimum of 0 and a maximum of 61.41 with a mean of 18.62 and a standard deviation of 19.58. As for the economic growth the minimum was -0.8 and a maximum of 8.06 while its mean and its standard deviation were 3.672 and 0.2304 respectively.

In terms of skewness the data on poverty as measured using HDI was skewed to the right and the kurtosis value of -1.65

reflects normal distribution since this value falls between -1.96 and +1.96. The data for ICT usage shows that the observations are skewed (skewness value=0.791) to the right and that the data is normally distributed since the kurtosis value of -0.665 is between -1.96 and +1.96. Economic growth data is skewed to the left (skewness value=-0.28828) and is normally distributed (-1.96 < kurtosis=-0.6465 >+1.96). Therefore, the data on the three study variables is normally distributed.

Pearson Correlation Analysis

Table 2: Pearson Correlation Analysis.

variable	HDI	ICT	EcGrt
HDI	1	0.9423	0.422
ICT		1	0.2441
EcGrt			1

Source: Researcher, 2022

Regression Analysis

The Effect of ICT on Poverty Reduction

Table 3: The Relationship Between ICT and Poverty.

Model Summary					
Model	R	R-square	Adjusted R-square	Sig	Standard Error of Estimate
1	0.94233	0.49000	0.37000	.000	1.5500-05E

Predictor: (constant), ICT Source: Researcher, 2022

Table 3 shows that there is a strong positive relationship between ICT and poverty as indicated by the value of 0.94233. Additionally, 49% of poverty levels in Kenya is explained by ICT. This means that increasing availability of ICT services to the members of the population can lead to poverty reduction significantly (p-value=000). However, 51% of poverty is explained by other factors other than ICT. Even when adjusted R-square is considered the explanatory power decreases from 49% to 37% increasing the percentage of other factors other than ICT that explain poverty to 63%. This means that in addition to focusing on ICT such as use of mobile phones, internet, Wi-Fi, WhatsApp and other telecommunication devices and systems, it is also important to take into account other

factors that have implications on poverty alleviation. Essentially, ICT in this case as measured using mobile phone subscriptions can significantly contribute to poverty reduction. In Kenya in particular mobile phones are used extensively in sales through MPesa, in marketing, in keeping money (as a store of value), as banks where money is kept in the phone, as channels for banking where we bank and withdraw through phones commonly known as mobile banking and so on. Table 4: The Effect of ICT on Poverty Reduction

Table 4: ANOVA.

Model		Sum of squares	df	Mean square	F	Sig
1	Regression	11.751	9	2.468	38.375	.000
	Residual	34.213	29	0.516		
	Total	45.964	38			

Predictor: (Constant), ICT; Dependent variable, poverty
Source: Researcher, 2022

The model reveals that ICT is significant in predicting the poverty levels in Kenya. Therefore, it is important to

encourage the use of mobile phones so as to reduce the poverty levels in Kenya.

Table 5: Regression Coefficients: ICT and Poverty Reduction.

Model	B	Std Error	Beta	t-value	Sig	
1	(Constant)	0.4883	18.13E-06	0.4357	1.0563	0.005
	ICT	0.00191	0.1867E-05	0.01621	1.2701	0.0142

Dependent variable: Poverty
Source, Researcher, 2022

Table 5 shows that 0.4357 of poverty is explained by ICT, thus even without ICT there will be poverty levels of 43.57%, a value which is significant (p of $0.005 < 0.05$). The coefficient of ICT is 0.00191 but significant ($p=0.0142 < 0.05$). Therefore ICT has a significant effect on poverty reduction. This calls for policy makers in the economy to

leverage on ICT, particularly the mobile phone usage to reduce poverty in the country.

The Relationship Between ICT and Economic Growth and Poverty Reduction

Table 6: ICT and Economic Growth and Poverty.

Model Summary					
Model	R	R-square	Adjusted R-square	Std Error of Estimate	
1	0.4243	0.8245	0.6029	F	Sig
				28.0567	0.001

Predictors: (Constant), ICT, EcGrt
Dependent variable: Poverty
Source: Researcher, 2022

After incorporating economic growth in the relationship, the strength of the relationship decreases from 0.94233 to 0.4243 meaning that economic growth watered down the relationship between ICT and poverty reduction. The explanatory power however increased with economic growth. ICT as measured using mobile phone subscription together with economic growth was able to increase the explanatory power from 49% to 82.45%. Economic growth therefore is important for poverty reduction. To reduce poverty levels, it is not only important to focus on mobile phone usage and other ICT components but to also ensure

that the economy is experiencing economic growth. The effect of both ICT and economic growth on poverty reduction is significant ($p=0.001 < 0.05$). Even when adjusted R-square is brought in the picture the explanatory power of both ICT and economic growth is higher than with the single variable of ICT only. Therefore, in addition to leveraging on ICT to reduce the poverty levels in Kenya it is also important to put in place policies to increase economic growth as low economic growth can lead to higher levels of poverty.

Table 7: The Effect of ICT and Economic Growth on Poverty Reduction.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std Error	Beta		
1	(Constant)	0.3753	4.6300E-07		0.7865	1.0583
	ICT	0.5738	1.05471E-07	0.4725	1.05471	0.0684
	EcGrt	0.3658	2.05927E-08	0.2741	2.05927	0.03513

Dependent Variable: Poverty
Source: Researcher, 2022

From table 7 there is a significant effect of economic growth on poverty reduction with a coefficient of 0.2741 (p value of $0.03513 < 0.005$). The effect of ICT on poverty reduction is not significant because the p value is 0.0684 (p value < 0.05) and a coefficient of 0.4725. Therefore, after incorporating economic growth into the equation the effect of ICT on poverty becomes insignificant and that of the control variable which is economic growth becomes significant. Additionally, poverty can be reduced by 37.53 percent even without ICT and without an economy experiencing economic growth.

Conclusions and Recommendations

The above discussion and results show that Kenya can benefit more in poverty reduction through the use of ICT. It has been argued here that ICT can contribute to poverty reduction, if it is tailored to the needs of the poor and if it is

used in the right way and for the right purposes. There is therefore need for the Kenyan economy to improve and promote mobile phone usage. This can be done by ensuring that all the marginalised people who lack access to mobile phones are given access to mobile phones. To promote this, the government can design effective policies that allow companies that produce and supply mobile phones to meet the untapped market of people who do not have access to mobile phones. An alternative may call for incentivising or providing subsidies to companies the provide mobile phones so that the final price of the mobile phones is relatively affordable. This will help the less privileged to afford mobile phones and to ultimately use the mobile phones for economic activities which in turn improve their living standards reducing poverty.

Incorporating economic growth eliminates the significance of contribution of ICT to poverty reduction while

increasing the role of economic growth in poverty reduction. Therefore, boosting economic growth can also help to reduce poverty, but this is unlikely to happen in countries where there are persisting and fundamental socio-economic inequalities. Like all technologies, ICT offers tools and applications but no solutions. The solutions to the problem of poverty are what they have always been: economic growth, enabling infrastructure, the creation of livelihoods, education and healthcare, and sufficiently democratic government to ensure that economic benefits are not cornered by the powerful elites. In countries such as Kenya, the usage of mobile phones has helped in promoting economic activities such as farming and small and medium enterprises. A comprehensive poverty reduction program is required to turn the vicious cycle of poverty into a virtuous cycle of well-being. It would need to include; first, sustainable and pro-poor growth with investments in both physical and social infrastructure; second, inclusive social development programs that promote equity and empowerment of the poor; third, efforts in good governance with effective policies and institutions, efficient and accountable public sector management, and legal and judicial reform; and fourth, efforts in promoting participatory decision-making. Economic growth needs to be broad-based and pro-poor involving the sectors that are most important for poverty reduction. There cannot be a one-fit policy for all, but the most effective strategy needs to be worked out that suits Kenya as a country taking into consideration historical trajectories and the socio-economic and political context of the country. Benefits of growth need to be distributed as evenly as possible, across the regions and social groups. Any strategy will not succeed if it bypasses geographic areas or sectors where the poor are concentrated, or if it fails to make intensive use of the unskilled labour of the poor.

Government, market, civil society, and the community, all need to work together to create conditions that will enable the poor to overcome their poverty, build their physical, economic and social assets, improve their capabilities, safeguard their security and reduce their risks and vulnerability to various external misalignments. But the market alone may not be able to meet all socially and economically desirable objectives of the ICTs, and it will be the role of the government to safeguard access to the poor, even with targeted subsidies.

Care needs to be taken to see that the ICT programs are not just technology-driven but respond to the needs of the poor, when it comes to content, language, skills, design, and price. It is important to address the sectors and areas that are of direct relevance to poverty reduction and where the use of ICTs can make a difference. Local communities should be involved in the design of universal access programs through consultations, surveys and demand studies particularly working out mechanisms to reduce call rates to enable cheap and affordable communication by the poor.

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