Research Paper	Open Access

Impact of Information and Communication Technology (ICT) on Rural Development in Kogi State

AremaBunmi Israel (Ph.D.)
Department of Economics, Joseph Ayo Babalola University, Ikeji-Arakeji, Osun State, Nigeria.

Abstract: Rural areas in Kogi State Nigeriaare facing neglect with attendant rise in the rates of poverty, unemployment and general underdevelopment thereby aggravating rural-urban migration. The underdevelopment of rural areas in the State calls for modern day innovations that Information and Communication Technology (ICT) offers. This study investigated the impact of ICT on rural development in Kogi State. Primary data were collected through household survey using structured questionnaire. The structured questionnaire was validated in a departmental seminar where the proposal and draft of the instrument were presented. Multi-stage sampling method was adopted to select 10 households each from 120 rural communities that were earlier randomly selected from the 21 Local Government Areas (LGAs) of the State. This makes a total sample of 1,200 households used in the survey. The data collected were analyzed through the use of descriptive and inferential statistics. Three models of regression were estimated in the study; two were estimated using ordinary least square technique while one was estimated using binary choice (LOGIT) technique. The study found out that ICT have had positive and statistically significant impact on poverty reduction, employment generation and agricultural output in rural areas of Kogi State at 5% significance level. The study recommended that Kogi State government,Non-Governmental Organizations and individual philanthropists should establish more ICT training centres and Community Internet Service Centres (CISC) in rural areas. Also, rural dwellers in Kogi State should make themselves available for ICT training.
Key Words: Information, Communication, Technology, Rural Development JEL Classification: O30, R11, R20

I. Introduction

One of the goals of any government is to achieve and sustain accelerated growth and development of the economy. To achieve this goal, efforts were made to put in place developmental programmes that were intended to translate into improvement in the living standards of the people. With a growing population of over 206 million (NPC, 2020), Nigeria needs to put in place more developmental programmes that will translate into reduction in the rate of poverty, unemployment and income inequality. For developmental programmes to succeed, they must take into consideration the development needs of both the urban and rural dwellers in a way that will bring about a holistic transformation of the people's living standards and create economic opportunities for the people regardless of whether they live in urban or rural areas (Muoghalu, 1992).

The observed poor economic condition of rural areas in Nigeria is not different from what is obtainable in Kogi State. According to the Kogi State Government (2012), the state of infrastructure in the state has declined over the years. Generally, the road networks are in poor condition and rural-urban landscape is chaotic, disorderly and unsanitary. Water supply is perennially inadequate; the state transport company is moribund; housing supply is inadequate and substandard which calls for attention.

The underdevelopment of rural areas in Kogi State thus requires a pragmatic and modern day innovation that makes development more inclusive and participatory. One tool that will make this possible is the use of Information and Communication Technology (ICT), given its numerous advantages such as increased information access and dissemination, economic empowerment, knowledge and skill enhancement, job creation and increase in Gross Domestic Product (GDP) (Abdulraheem, 2012 and Adigwe, 2012).

Muoghalu (1992) asserted that despite having the overwhelming proportion of our national population in the rural areas, the rural areas are characterized by pervasive and endemic poverty, manifested by hunger, malnutrition, poor health, inadequate access to formal education, liveable housing and various forms of social and

political isolation compared with their urban counterparts. Muoghalu (1992) opined that rural stagnation or underdevelopment, poverty and unemployment constitute the pushing factors that are fuelling rural-urban migration.

The main objective of this study is to examine the impact of ICT on rural development in Kogi State. The study covers 120 rural communities selected across all the Local Government Areas in Kogi State. Following the introduction; section two is the conceptual review on ICT, rural development, theoretical nexus between ICT and rural development, empirical discourse of the relationship between ICT and rural development; section three is the methodology; discussion of results is presented in section four while section five contains the conclusion and recommendations.

II. Conceptual Clarifications

2.1 Information and Communication Technology (ICT)

ICTs are those technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. Michiels and Van Crowder (2001) defined ICTs as a range of electronic technologies which when converged in new configurations are flexible, adaptable, enabling and capable of transforming organisations and redefining social relations. The range of technologies is increasing all the time and there is a convergence between the new technologies and conventional media. According to Rodriguez and Wilson (2000), ICT is a set of activities which facilitate and enhance the processing, transmission and dissemination of information by electronic means.

Ogunsola and Aboyade (2005) posited that ICT came into being as a result of related technologies clearly stated by their functional usage in information access and communication which is centralized through the Internet. This rapid and ongoing convergence means that devices such as digital cameras, digital video cameras and players, personal digital assistants, slide projectors and mobile telephones are also compatible with more traditional media such as radio (digital, satellite) and television (cable, digital, satellite).

According to Adigwe (2012), ICT is perceived to be a force to be reckoned with in the 21st century because it has caused and continues to cause major changes in the way we live. In the electronic media, ICT has ignited and provoked radical and drastic changes that have affected and revolutionized the broadcast industry, most especially in immediacy and timeliness of news. According to him, ICTs play a pivotal role in the world economy and the ICT sector is increasing its trend share of economic activity. ICTs are an important input for economic performance. Information is critical to the social and economic activities that comprise the development process. Telecommunications, as a means of sharing information, is not simply a connection between people, but a link in the chain of the development process itself (Hudson, 1995).

According to the Information Technology Association of America (ITAA) (n.d.), ICT is a combination of software industry, office machines, data processing equipments, and other communication hardware and software facilities. Furthermore, nations use ICT as any kind of communicational or programming device such as radio, television, cellular phone and computer or satellite network systems, in order to gain necessary information. In this regard, the World Information Technology and Services Alliance (WITSA) (n.d.) defines ICT as communicational equipment and software services required to study, plan, support and manage information systems based on computer software as well as hardware.

ICT is also defined as a shorthand for the computers, software, networks, satellite links and related systems that allow people to access, analyze, create, exchange and use data, information and knowledge in ways that were almost unimaginable (Association of African Universities, 2000). The prevalence and rapid development of ICTs has transformed human society from the information technology age to the knowledge age (Galbreath, 2000).

Cesaretti and Misso (2012) stated that information and knowledge represent notions now in vogue in the debate among economists. They noted that the increasingly important role attributed to information depend not only on structural changes that it produces but also from its location in an evolutionary process that is characterized by the transition to an economy based on services (outsourcing) and the extension of markets and production combinations at the global level (globalization) and by the continuous increase in the general level of the stock of information and knowledge.

2.2 Rural Development

Ijere (1992) defined rural development as part of general economic development which in itself is an increase in the material and non-material well-being of the people over time. The only difference between the two is the emphasis of the first on the rural sector. Rural development is a strategy designed to improve the economic and social life of a specific group of people, the rural poor. It involves extending the benefits of development to the

poorest among those who seek a livelihood in the rural areas. The group includes small-scale farmers, tenants and the landless (Aliyu, 1999).

Rural development is about promoting the welfare and productivity of rural communities, about the scope and quality of participation of rural people in that process, and about the structure, organization, operations and interactions and facilities which make this possible (Ocheni&Nwankwo, 2012). Rural development generally refers to the process of improving the quality of life and economic well-being of people living in relatively isolated and sparsely populated areas (Moseley, 2003). Furthermore, Moseley (2003) asserted that rural development is also characterised by its emphasis on locally produced economic development. In contrast to urban regions, which have many similarities, rural areas are highly distinctive from one another. For this reason there is a large variety of rural development approaches used globally.

Rural development has traditionally centred on the exploitation of land-intensive natural resources such as agriculture and forestry. However, changes in global production networks and increased urbanisation have changed the character of rural areas. Increasingly, tourism, niche manufacturers, and recreation have replaced resource extraction and agriculture as dominant economic drivers (Ward & Brown, 2009).

Rural development actions are mainly and mostly targeted at the social and economic development of the rural areas (Chigbu, 2012). Wiggins & Proctor (2001) observed that rural development programmes are usually top-down from the local or regional authorities, regional development agencies, Non-Governmental Organisations (NGOs), national governments or international development organisations. They are of the opinion that local populations can also bring about endogenous initiatives for development. In their view, rural development aims at finding the ways to improve the rural lives with the participation of rural people so as to meet the needs of rural areas.

Abdulraheem (2012) asserted that, in the rural context, development involves use of physical, financial and human resources for economic growth and social development of the rural economies. He opined that the term rural development also represents improvement in quality of life of rural people in villages. According to him, rural development is a strategy that enables a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need. It is a process that leads to sustainable improvement in the quality of life of rural people, especially the poor. According to OECD (2006), "three-quarters of impoverished groups live in rural areas". Impoverished (poverty) indicates conditions resulting from income poverty. The organization asserted that improvement of livelihood is a central component of rural development.

According to Roy (2015), rural development is development that benefits rural populations; where development is understood as the sustained improvement of the population's standards of living or welfare. Since the 1970's, rural development as a concept has been highly associated with the promotion of standards of living and as a precondition for reducing rural poverty.

2.3 Theoretical Nexus ICT and Rural Development

Matambalya (2003), cited in Nafziger (2006) observed that in the 1980s, economists studying the sources of growth noticed a productivity paradox, observing no positive relationship between ICT investments and productivity. In 1987, the Nobel economist Robert Solow quipped that "You can see the computer age everywhere but in the productivity statistics" (Crafts, 2001) cited in Nafziger (2006). But history indicates a substantial time lag for major innovations. Like all enabling and general purpose technological innovations, the computer started as a crude specific-purpose technology, taking decades to be improved, embodied in reorganised workplaces, and diffused throughout the economy. The more demanding the technology is, the longer the learning curve (Lipsey, 2001) cited in Nafziger (2006).

Meng and Li (2002) observed that ICT is the major driving force of the New Economy. They further asserted that while there is ample evidence that the information and communications industry has contributed a great deal to the overall economic growth of the developed countries, the role of the ICT industry in developing countries is not clear. Due to shortage of capital investment and technical know-how, developing countries lag far behind the industrialised nations in their ICT-industry development and diffusion.

According to the World Bank (1998), recent development thinking has been based on the assumption that markets work well enough to ensure development and alleviate poverty. Our growing understanding of information constraints suggests that markets alone are often inadequate; societies also require policies and institutions to facilitate the acquisition, adaptation, and dissemination of knowledge, and to mitigate information failures, especially as they affect the poor. This requires effective consideration of the role of knowledge in development in order to facilitate greater access to and use of ICTs through policy planning.

According to UNDP (2001), the issue of technological transformation and its impact on development cannot be ignored. The report further asserts that, 'no individual, organisation, business or government can ignore these changes. The new terrain requires shifts in public policy – national and global – to harness today's technological transformations as tools for human development'. Future rural development strategies will be dependent on these changes in policy planning and it is for this reason that the potential role of ICTs for rural development needs to be highlighted and discussed. Policy processes that are aimed specifically at addressing poverty have attempted to take a multi-sectoral approach.

In addressing the role of ICTs in rural development strategies, it is less a question of differentiating between spatial needs (rural versus urban) and more about differentiating between opportunities. Rural areas hold substantial human and natural potential to realise development goals (reduce inequality, reduce poverty and increase empowerment) by harnessing knowledge. It is unlikely that there are uses for ICTs that are exclusive to rural areas but the potential of ICTs to play a comparatively greater role (i.e. not just raising more people out of poverty but raising the poorest people out of poverty) in rural development than elsewhere is very real (UNDP, 2001).

UNDP (2001) observes that current approaches, which emphasise integration of technology and globalisation towards a network age in which everyone is more or less connected, need to take account of the underlying constraints to integration of rural areas. Without understanding of these limitations it will continue to be difficult to take the initiative and act strategically on what is becoming increasingly recognised. Now that new technology makes information sharing much easier and cheaper than ever before, it is vital that these tools be used for the public good (World Bank, 1999).

Kenny, et. al. (2000) observed that current debates on the potential role of ICTs for rural development tend to be constrained by an inherent mutual lack of understanding between technology drivers and development agencies. As a result, ICT applications in developing countries remain largely uninformed by recent developments in the wider development literature and conversely, many development agencies have failed to effectively mainstream strategies to harness the potential of ICTs.

ICTs have been described as the means whereby developing countries can leapfrog over development stages and technology barriers to achieve both economic growth and broad-based development. Other views are less optimistic about attributing direct benefits to ICT and raise concerns that a one-dimensional push for their greater use may increase the dependency of poorer countries, as well as the divide between urban and rural areas, the rich and the poor, and between generations. Thus, while there may well be a link between ICT and poverty reduction, the mechanisms through which the connection takes place are not fully understood (May, 2011).

Abdulraheem (2012) asserted that ICT is a powerful and productive system which can accelerate economic and social development in rural areas. ICT have a potential for economic growth and social empowerment. Direct or indirect application of ICT, in rural development sector has also been referred to as 'Rural Informatics'. Rural economies can benefit from ICT by focusing on social production, social consumption and social services.

Stratigea (2013) opined that increasing accessibility of rural regions to ICTs and their applications seems to be a promising policy option for the future development of rural regions, with beneficial influences to citizens, firms and rural communities as a whole, due to their potential of establishing an open platform for effective and efficient interaction and intelligence gathering, that serves both the micro-level(individuals and firms) and the macro-level (rural regions) towards the enhancement of their competitive position in the new economy context.

However, the expansion of ICT can also have direct negative outcomes. Expenditure on ICT has been shown to be the cause of intra-household conflict, to foster male control over resources, and to direct household resources away from food and other essentials. Indeed, human rights concerns have been raised over the possible use of conflict minerals in the manufacture of ICT devices as well as the use of child labour. As with any technology, ICT must be placed within the local context of capabilities and needs, and requires a sound political economy along with the political will to prioritize development problems (May, 2011).

Information about markets is vital and among the range of policy tools which can be employed to promote rural employment. Market information systems, including those on labour markets, can improve rural labour market outcomes by assisting rural households in finding more and better market employment and training opportunities (Roy, 2015). With the advancement in ICT market information systems can provide farmers and traders with timely and accurate prices, buyer contracts, buyer and producer profiles and trends, import regulations, standards specifications and so forth.

2.4   Empirical Discourse of the Nexus between ICT and Rural Development

In the first systematic analysis of the impact of computer use on wages, Krueger (1993) suggested that workers who used computers earned about 10– 20 percent more than workers who did not. Autor, Frank, & Richard

(2003) argue that increased computer use can explain most of the increase in non-routine job tasks; hence the advanced skill content of jobs, during the 1970s, 1980s and 1990s can explain most of the increased relative demand for college-educated workers. Velleta and MacDonald (2005) used regression model similar to that of Krueger's (1993). After applying an appropriate mathematical transformation based on the logarithmic regression function, the author obtained the estimated percentage effect of computer use on wages. The results of the estimation show that the return to computer use reached a peak in 1993, with a 24.2 percent wage advantage over otherwise similar workers. The estimated return to computer use for the full sample declined to 19.2percent in 2001. However, the return to individuals with a college or graduate degree increased dramatically during the previous period and reached a peak of 31.4 percent in 2001.

The International Institute for Communication and Development (IICD) (2015) believes that people need access to information and communication to improve their lives, particularly in developing countries. "Farmers, workers and entrepreneurs can use ICT to access market information, improve quality and productivity and strengthen business skills and employment opportunities". The explosion of ICT, especially mobile phones, has transformed the development landscape of rural sub-Saharan Africa. By integrating once-isolated people into economies and polities, mobile phones and other technologies are improving life for rural populations, sometimes dramatically.

SANGONeT (2012) asserted that the spread of ICTs is broadly associated with economic growth and poverty reduction. According to the organisation, in a study based on data from 113 countries over 20 years, it was found out that one-percent increase in ICT resulted in growth in GDP of 0.03 percent. For mobile networks, the relationship appears more marked, with one percent growth in mobile networks correlated with a 5 percent increase in per capita GDP. Also, other studies such as Umeano (2012), Obayelu and Ogunlade (2006), Adesola (2012) found a negative correlation between the use of ICTs and the human poverty index; that is, the more widely the ICT use, the lower the poverty rate. While these studies show correlation, not causation, ICTs can be a powerful tool for income generation and empowerment.

Oladunjoye and Audu (2014) conducted a study on the impact of ICT on youth and its vocational opportunities in Nigeria with Idah Local Government Area of Kogi State as a case study. The study was essentially descriptive in nature. They found out that ICT increases the vocational opportunities of youths, improve the socio-economic well-being of the citizens and addresses the problem of unemployment in Nigeria. Oye, Inuwa& Ahmad (2013) in their study of the role of ICT and its implications for unemployment and Nigerian GDP, concluded that ICT can be used as a tool for combating unemployment in Nigeria.

Umeano (2012) concluded that the activities of ICT entrepreneurs could reduce unemployment and alleviate poverty in Nigeria. Obayelu and Ogunlade (2006) also observed that through the use of ICT such as the GSM, transaction costs of many poor Nigerians have drastically reduced and that technology has led to increased service innovation, efficiency and productivity. Ugboh and Tibi (2008) examined the use of information and communication technology in agricultural and rural transformation in Delta State. They concluded that ICT is a veritable tool and requirement for agricultural and rural transformation even though it is not widely accessed by farmers in these communities. These studies used descriptive statistics in their analysis.

Adesola (2012), Isife et al (2013) observed that ICTs are critical components of poverty alleviation strategies, because they offer the promise of easy access to huge amounts of information useful for the poor. Sanusi, et al (2010), Kayode-Adedeji and Agwu (2015) observed that ICTs have a high possibility of effecting positive change in the life and activities of the farmers when additional input and effort are provided to the extension method of communication in order to create a multi-dimensional approach that will adequately suit farmers' local situation and conditions. Yekini, et al (2012) found out that ICT can promote increasing productivity, improve market access and create employment opportunities.

Urama and Oduh (2012) examined the impact of developments in telecommunications on poverty in Nigeria. They concluded that the developments in telecommunications to a very large extent have a positive impact on poverty reduction in Nigeria. Also, Orji et al (2016) examined ICT usage and unemployment rate nexus in Nigeria. They concluded that ICT had a significant positive impact on employment rate in Nigeria. Kabir et al (2014) examined the extent to which the evolution of GSM has been able to reduce poverty in Ilorin metropolis. They concluded that GSM has the potentials to reduce poverty in the study area. These studies used descriptive statistics in their analysis.

III. Methodology

This study utilized the survey design, which was conducted through the administration of structured questionnaire to the people in selected rural areas in Kogi State. The survey design was adopted because it made it easy for people to participate and remain anonymous. The study also used quantitative and qualitative data which were obtained through the use of a structured questionnaire.

3.1 Instrument for Data Collection

Copies of a structured questionnaire were used for data collection in this study. The questionnaire sought information about households' characteristics, agricultural output and households' access to, ownership and utilization of ICT.

3.2 Method of Analysis

Three (3) econometrics models were estimated in the study in order to investigate the impact of ICT on rural development in Kogi State. The two (2) of the models were estimated with the use of Ordinary Least Square (OLS) technique while one (1) was estimated with the use of Binary Choice (LOGIT) technique using computer software (E-views version 10). The estimated models were subsequently analyzed on the basis of the sign and significance of the coefficients of the variables of interest.

3.3 Model Specification

Rural Development Model 1:

$$\text{In } C_j = \beta_j X_j + \lambda_1 ICT_a + \lambda_2 ICT_o + \lambda_3 ICT_u + \lambda_4 HIK + q_j \dots\dots\dots\dots\dots\dots\dots (3.3)$$

Where: C_j = total daily per capita consumption expenditure of household j in rural communities in Kogi State.

X_j = vector of household characteristics such as household size (HS), head of household's level of education (HE), age of household head (AH), marital status of household head (MS), gender of household head (GH), housing of household (HH) and electricity available in household (EH).

ICT_a = Index of Access to ICT

ICT_o = Index of Ownership of ICT

ICT_u = Index of Utilization of ICT

HIK = Household ICT Knowledge

β_j = co-efficient vector of household characteristics

$\lambda_1, \lambda_2, \lambda_3, \lambda_4$ = co-efficients of ICT variables

q_j = random error term

The a-priori expectations were that: $\beta_j, \lambda_1, \lambda_2, \lambda_3 > 0$.

Model 2:

$$E_i = \alpha + \delta_i X_i + \phi_1 ICT_a + \phi_2 ICT_o + \phi_3 ICT_u + \phi_4 HIK + n_i \dots\dots\dots\dots (3.6)$$

Where: E_i = employment status (the logit (In of the odds) of being unemployed)

X_i = vector of household characteristics (as stated in model 1)

ICT_a = Index of Access to ICT

ICT_o = Index of Ownership of ICT

ICT_u = Index of Utilization of ICT

HIK = Household ICT Knowledge

δ_i = co-efficient vector of household characteristics

$\phi_1, \phi_2, \phi_3, \phi_4$ = co-efficients of ICT variables

n_i = random error term

The a-priori expectations were that: $\delta_i, \phi_1, \phi_2, \phi_3 > 0$.

Model 3:

$$\text{Log } Q = \text{Log } A + \alpha\text{Log } K + \beta\text{Log } H + \delta\text{Log } P + \theta_i X_i + g_1 ICT_a + g_2 ICT_o + g_3 ICT_u + g_4 HIK + w_i \dots (3.9)$$

Where Q = agricultural output (proxied by monetary value of total agricultural output)

A = constant term

K = machinery and fertilizer (proxied by monetary value of farm tools and expenditure on fertilizer)

H = work force (proxied by number of people engaged on the farm)

P = land cultivated (proxied by number of acres of land cultivated)

X_i = vector of household characteristics (as stated in model 1)

ICT_a = Index of Access to ICT

ICT_o = Index of Ownership of ICT

ICT_u= Index of Utilization of ICT
HIK = Household ICT Knowledge
α, β, δ= Co-efficients of independent variables
$θ_i$= co-efficient vector of household characteristics
g_1, g_2, g_3, g_4= co-efficients of ICT variables
w_i= random error term

The a-priori expectations were that: α, β, δ, $θ_i$, g_1, g_2, g_3> 0.

IV.   Empirical Results

4.1   Impact of ICT on Poverty Reduction in Rural Areas of Kogi State

Table 4.1: Impact of ICT on Poverty Reduction in Rural Areas of Kogi State

ICT OLS Model Estimation (Aggregate)		
Dependent Variable: Poverty (Total Daily Per Capita Consumtion-Expenditure) in Naira		No. of Obseravtions: 1,120
Independent Variables	Coefficient	Probability
Constant	7.3279	0.0000
Household Size	-0.1091	0.0000
Household's Head Level of Education	0.0679	0.0000
Age of Household Head	0.0280	0.0000
Marital Status of Household Head	-0.4749	0.0000
Gender of Household Head	0.2185	0.0000
Housing of Household	0.0464	0.1231
Electricity Available in the Household	-0.0749	0.0490
Household ICT Knowledge	0.1449***	0.0001
Household Access to ICT	0.144***	0.0000
Household Ownership of ICT	0.3361***	0.0000
Household Utilisation of ICT	0.144***	0.0000
R-Squared	0.5714	
F-statistic	87.9111	0.0000

(***) Significant at 1%, (**) Significant at 5% and (*) Significant at 10%.

Table 4.1 above, shows the estimated OLS model of the impact of ICT (aggregate) on poverty reduction (proxied by total daily per capita consumption expenditure) in rural areas of Kogi State. The model has an R-square of 0.5714; this indicates that about 57 percent variation in the dependent variable (poverty reduction) is explained by the explanatory variables (vector of household characteristics and the ICT variables (see section 3.7)), while the error term takes care of the remaining 43 percent that are variables that were not included in the model because of certain qualitative features. The F-statistic (87.9112) shows that the model as a whole is statistically significant at 1 percent significance level.

Holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that all the ICT variables (access to ICT, ownership of ICT, utilization of ICT and ICT knowledge) have positive signs. These imply that household access to ICT, ownership and utilization of ICT, and ICT knowledge contribute to poverty reduction in rural areas of Kogi State. Statistically, the positive impacts of access, ownership, and utilization and ICT knowledge on poverty reduction are all significant at 1 percent.

On the basis of the magnitude of the coefficients of the ICT variables, households' ownership of ICT appears to have had more positive impact on poverty reduction in the rural areas of Kogi State since it has the highest coefficient (0.3361). From the foregoing therefore, it is expected that as more people in the rural areas in Kogi State acquire ICT knowledge, have access to ICT, own and utilise ICT; their level of poverty will decrease ceteris paribus.

The foregoing analyses indicate that access, ownership and utilization of ICT have contributed to poverty reduction in rural areas in Kogi State. This conclusion is in line with the findings of other researchers such as Greenberg (2005), Chand et al (2005), Adesola (2012), Oladunjoye&Audu (2014), Isife et al (2013); to mention just a few.

4.2   Impact of ICT on Employment Generation in Rural Areas of Kogi State

Table 4.2: Impact of ICT on Employment Generation in Rural Areas of Kogi State

ICT LOGIT Model Estimation (Aggregate)			
Dependent Variable: Employment Status	No. of Observations: 1,120		
Independent Variables	Coefficient	Probability	
Constant	-1.5922	0.0000	
Household Size	0.0133	0.6515	
Household's Head Level of Education	0.0326	0.0155	
Age of Household Head	0.0404	0.0000	
Marital Status of Household Head	-0.2022	0.1642	
Gender of Household Head	-0.0336	0.7509	
Housing of Household	0.1416	0.1343	
Electricity Available in the Household	-0.1784	0.1460	
Household ICT Knowledge	0.0795	0.4919	
Household Access to ICT	-0.1658	0.1505	
Household Ownership of ICT	-0.1887	0.1140	
Household Utilisation of ICT	0.4192***	0.0000	
(***) Significant at 1%, (**) Significant at 5% and (*) Significant at 10%.			

Table 4.2 above, shows the estimated OLS model of the impact of ICT (aggregate) on employment in rural areas in Kogi State. Holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that households' utilization of ICT and ICT knowledge; increases the probability of a household to become employed. These aforementioned ICT variables all have the positive signs. Households' access to ICT and ownership of ICT on the other hand, decreases the probability of a household becoming employed. Statistically, the coefficient of households' utilization of ICT is significant 1 percent while the coefficients of households' access to ICT, ownership of ICT and ICT knowledge are not significant at 10 percent.

The foregoing analyses indicate that households' ICT knowledge and the utilization of ICT have increased the chances of rural dwellers in Kogi State to become employed. Households' access to ICT and ownership of ICT have negatively impacted employment in the rural areas in Kogi State.

4.3   Impact of ICT on Agricultural Output in Rural Areas of Kogi State

Table   4.3:   Impact   of   ICT   on   Agricultural   Output   in   Rural   Areas   of   Kogi   State

ICT OLS Model Estimation (Aggregate)			
Dependent Variable: LOG (Agricultural Output)		No. of Obseravtions: 314	
Independent Variables	Coefficient	Probability	
Constant	1.8649	0.0000	
LOG (Machinery and fertilizer)	0.4381	0.0000	
LOG (Land cultivated)	0.0872	0.2501	
LOG (Labour force)	0.0182	0.7047	
Household Size	0.0305	0.0010	
Household's Head Level of Education	0.0390	0.0000	
Age of Household Head	0.0145	0.0000	
Marital Status of Household Head	-0.2112	0.0003	
Gender of Household Head	0.1195	0.0093	
Housing of Household	-0.0431	0.2208	
Electricity Available in the Household	0.2927	0.0001	
Household ICT Knowledge	0.0418	0.2167	
Household Access to ICT	0.096***	0.0000	
Household Ownership of ICT	0.0687***	0.0000	
Household Utilisation of ICT	0.0468***	0.0053	
R-Squared	0.6215		
F-statistic	35.6528	0.0000	
(***) Significant at 1%, (**) Significant at 5% and (*) Significant at 10%.			

Table 4.3 above, shows the estimated OLS model of the impact of ICT (aggregate) on agricultural output in rural areas of Kogi State. The model has an R-square of 0.6214; this indicates that about 62 percent variation in the dependent variable (agricultural output) is explained by the explanatory variables (vector of household characteristics and vector of ICT variables (see section 3.8)), while the error term takes care of the remaining 38 percent that are variables that were not included in the model because of certain qualitative features.

Holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that all the ICT variables have the positive signs. These imply that households' access to ICT, ownership of ICT, utilization of ICT and their ICT knowledge have had positive impact on agricultural output in rural areas of Kogi State.

Statistically, the positive impact of households' access to ICT, ownership of ICT and utilization of ICT are significant at 1 percent; households' ICT knowledge on the other hand is not statistically significant. On the basis of the magnitude of the coefficients of the ICT variables, households' access to ICT appears to have had more positive impact on agricultural output in the rural areas of Kogi State since it has the highest coefficient (0.09597).

These results show that households' access to ICT, ownership of ICT, utilization of ICT and their ICT knowledge increases their agricultural output; especially when ICT media make relevant and timely information available to farmers in the rural areas of Kogi State.

V.   Conclusion and Recommendations

ICT has positively impacted the people in the rural areas in Kogi State. However, the people in the rural areas in Kogi State are facing the challenges of ICT illiteracy, epileptic and lack of electricity, lack of access, ownership and utilization of ICT gadgets. It is therefore recommended that the Kogi State Government, Non-Governmental organizations and individuals should establish ICT training centres across the State to provide technical training for the unemployed people. This will not only result in reduction in unemployment in the State but also it will provide the much needed ICT technicians that will provide ICT gadget repair/maintenance services to the people in rural areas in Kogi State.

References

[1].   Abdulraheem, A. (2012). ICT for rural development: A view. *Kurukshetra - A Journal on Rural Development*, 60(3), 31 – 33.
[2].   Adesola, S. A. (2012). Alleviating poverty through ICT as a means of sustainable socio-economic growth in Nigeria.*International Journal of Academic Research in Economics and Management Sciences,* 1(1)
[3].   Adigwe, I. (2012). *The impact of information and communication technology on news processing: A study of NTA and AIT*. Unpublished Project, Lagos State University, Lagos.
[4].   Aliyu, A. (1999). *Perspectives of poverty alleviation programmes in Nigeria and the way forward*. Abuja: The family economic advancement programme
[5].   Autor, D. H., Frank, L. & Richard, J. M. (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics*. 118(4), 1279 – 1333.
[6].   Cesaretti, G. P. &Misso, R. (2012).*Sustainability of rural systems and poles of excellence: The role of information and communication technologies*. Retrieved from www.shutterstock.com on 26/05/14
[7].   Chigbu, U.E. (2012). Village renewal as an instrument of rural development: Evidence from Weyarn, Germany. *Community Development*, 43(2), 209 - 224.
[8].   Chand, A., Leeming, D., Stork, E., Agassi, A. &Biliki, R. (2005).*The impact of ICT on rural development in Solomon Islands: The Pfnet case*. Fiji: ICT Capacity Building at USP Project, the University of the South Pacific, 2005.
[9].   Galbreath J (2000). Knowledge management technology in education: An overview. *Education Technology*, 9:28-33.
[10].   Greenberg, A. (2005). *ICTs for poverty alleviation: Basic tool and enabling sector*. Quebec: Sida
[11].   Ijere, M. O. (1992). *Leading issues in rural development*. Enugu: Acena Ventures Ltd.
[12].   Isife, B. I, Nnodim, A. U. & Albert, C. O. (2013).The role of ICT in poverty alleviation among rural farmers in Abia State.*Journal of Computer Engineering and Intelligent Systems*. 4(*7*); 20 – 24.
[13].   ITAA   (n.d).Information   and   Communication   Technology.Retrieved   from http://en.wikipedia.org/wiki/Information_technologyon 16/05/16.

[14].   Kabir, M., Hassan, K., Yusuf, H. A., &Abdulaziz, I. (2014). Poverty Reduction through the ICT: Global System for Mobile Communication (GSM) Perspective. *Journal of Economics and International Finance*, Sept. 2014. Pg. 211 – 215.

[15].   Kayode-Adedeji, T. K. &Agwu, E. M. (2015).Application of ICT to agriculture as a panacea to unemployment in Nigeria.*International Journal of Advanced Multidisciplinary Research and Review*. 3(*4*): 26 – 48.

[16].   Kogi State Government (2012).*Blueprint for the Transformation of Kogi State (2012 – 2016).* Lokoja: Kogi State Government.

[17].   Krueger, A. (1993). How computers have changed the wage structure: Evidence from Microdata, 1984 – 1989. *Quarterly Journal of Economics*, 08(1), 33 – 60.

[18].   Michiels, S.I. & Van Crowder, L. (2001).*Discovering the magic box: Local appropriation of ICTs*. Rome: FAO

[19].   Moseley, M. J. (2003). *Rural development: Principles and practice*. London: Sage.

[20].   Muoghalu, L.N. (1992). "Rural Development in Nigeria: A Review of Previous Initiatives" in Olisa, M.S.O. and Obiukwu, J.I. (eds) *Rural Development in Nigeria: Dynamics and strategies*Awka: Meklinks Publishers.

[21].   National Population Commission (2020).National Population Estimates.Retrieved from https://nigerianstat.gov.ng on 8/5/21.

[22].   OECD (2006).*The new rural paradigm: Policy and governance*. Paris: OECD.

[23].   Obayelu, A. E. &Ogunlade, L. (2006).Uses of ICT for Gender Empowerment & Sustainable Poverty Alleviation.*International Journal of Education and Development*, 2 (2).

[24].   Oladunjoye, I. M. &Audu, J. S. (2014).The impact of information and communication technology on youth and its vocational opportunity in Nigeria.*Journal of Good Governance and Sustainable Development in Africa,* 2(1).

[25].   Oye, N. D., Inuwa, I. & Ahmad, M. S. (2013). ICT and unemployment in Nigeria: Implication on Nigerian GDP. *International Journal of Social Ecology and Sustainable Development*. Retrieved from www.igi-global.com/chapter/ict-unemployment-nigeria/72266?camid=4v1 on 06/07/15

[26].   Ocheni, S. &Nwankwo, B. C. (2012).Analysis and critical review of rural development efforts in Nigeria, 1960-2010.*Studies in Sociology of Science*, 3 (3), 48-56.

[27].   Ogunsola, L. A. &Aboyade, W.A. (2005). Information and communication technology in Nigeria: Revolution or evolution. *Journal of Social Science*, 11 (1); 7 – 14.

[28].   Orji, A., Nwosu, E., Anthony-Orj, O. &Mba, P. (2016). ICT Usage and Unemployment Rate Nexus in Nigeria: An Empirical Analysis (April 2016). *Journal of Internet Banking and Commerce*, 21(2).Retrieved from www.tsuniversity.edu.ng/wp-content/uploads/2018/07/Access-of-Rural-Farmers-to-Information-and-Communication-Technologies2.pdf on 8/4/19.

[29].   Oladunjoye, I. M. &Audu, J. S. (2014).The impact of information and communication technology on youth and its vocational opportunity in Nigeria.*Journal of Good Governance and Sustainable Development in Africa,* 2(1).

[30].   Rodriguez, F. & Wilson, E. (2000). Are poor countries losing the information revolution? *World Bank Working Paper*. Washington D.C.: World Bank.

[31].   Roy, A. (2015). Rural development and rural employment. New Delhi, India: Random Publications

[32].   SANGONeT (2012).*ICTs for rural development*. Retrieved from www.unca.org/codi/documents/pdf/reportpercent20onpercent20E-Strategiespercent20inpercent20Africa.pdf on 15/04/14

[33].   Sanusi, M. A., Petu-Ibikunle, A. M. &Mshelia, C. M. (2010).The Influence of information and communication technology (ICT) on the dissemination of agricultural information among urban farmers in the Northern Guinea Savannah Zone of Nigeria.*African Scientist,* 11(2).

[34].   Ugboh, O. and Tibi, E. U. (2008).The use of information and communication technology (ICT) in agricultural and rural transformation in Delta State. Retrieved from www.semanticscholar.org/paper on 23/8/18

[35].   Umeano, N. E. (2012). ICT entrepreneurship development: A way of alleviating poverty in Nigeria. *Journal of Management and Entrepreneurial Development*, 2(1), 27 – 32

[36]. Urama, N. E. &Oduh, M. O. (2012).Impact of development in telecommunications on poverty in Nigeria.*Journal of Economics and Sustainable Development*, 3 (6), 25 – 35.

[37]. Ward, N. & Brown, D. L. (2009). Placing the rural in regional development.*Regional Studies* 43: 1237 – 1244.

[38]. Wiggins, S. & Proctor, S. (2001). How special are rural areas? The economic implications of location for rural development.*Development Policy Review*, 19(4), 427 – 437.

[39]. Yekini, N. A., Rufai, M. M., Adetoba, B. T., Akinwole, A. K. &Ojo, O. (2012). ICT "Tools" for poverty eradication and economic growth in Nigeria. *Greener Journal of Educational Research*, 2(1), 13 – 19.