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Exploring information and communication technology among rural dwellers in sub-Saharan African communities

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The study used survey design and collected data using a questionnaire. Stratified random sampling was employed to identify 12 rural communities evenly spread across the three senatorial districts of Kwara State, Nigeria. From each community, 125 respondents were purposively sampled, resulting in a sample size of 1500. Data collected were analyzed using frequencies and cross-tabulations. The results show the presence of ICT in the rural communities of a sub-Saharan African country and the need for the government to educate, train and implement policies that would help rural dwellers make effective and efficient use of ICT tools and infrastructures available in their domain.

Keywords: ICT, rural dwellers, rural communities, sub-Saharan Africa

Introduction

Information and Communication Technology (ICT) is an evolving technology which covers a wide range of concepts, methods and applications that have to do with information transmission, technology and management. ICT also denotes the use of computer and communication systems between computers (CTA 1999, 4). For instance, social media and electronic mail are some of the frequently used new ICT which has caused a cultural revolution in the way individuals and organizations interact. In the context of this research, ICT also covers any equipment or interconnected system of equipment that includes all forms of technology used to create, store, manipulate, manage, move, display, switch, interchange, transmit or receive information of various forms electronically. These may include ICT tools such as mobile phones, personal computers, radio, digital television, satellite terminals, robots and new digital technology platforms such as social media, e-mail, online news and others.

Technologies aid individuals, businesses organizations and government to access relevant information used for decision-making processes, but this hinges on the availability of comprehensive, timely and up-to-date information. ICT is an indispensable tool for development which should be embraced by all and sundry to enjoy its benefits. Without any gainsaying, ICT would positively influence rural development.

The availability of ICT has produced improvement in human activities and the general quality of life. This has geared many nations of the world to see ICT as tools that can jump start economies, especially developing economies in sub-Saharan Africa. Attesting to this is the proliferation of ICT facilities in the region, with Internet centres, telephone call centres, television viewing centres and radio stations dotting the landscape. These ICTs have become a platform that enhances communicational, informational, administrative and transactional activities of organizations in various sectors of the economy including education; hence its adoption by many individuals and

corporate establishments. Studies have been conducted to understand different dimensions of these ICTs, what they are used for, level of adoption and penetration, and level of satisfaction (Afolayan et al. 2015; AbdulRahman, Balogun, and Yahaya 2014; Ahlan and Balogun 2013). However, it is necessary to understand the distribution of these facilities in the rural communities of sub-Saharan Africa and who makes use of them.

The developmental potential within the orbit of ICT is vast. Consequently, with the United Nations and sub-Saharan governments' quest to position Africa at the forefront of development, it has become imperative to quantify the ICT facilities we have on the ground and identify their distribution across Sub-Saharan African communities. This will serve the purpose of determining what facilities are not available, those that are not adequate, and peculiarities of facilities in some specific areas. This information could provide those concerned with ICT in sub-Saharan Africa, especially the United Nations and governments, with the direction government policy on ICT issues should take, sensitize investors with information on areas of investment and possibly provide tourists with information on what facilities are available and where to locate them. This research also provides a better understanding of how ICT facilities are distributed within 12 rural communities of Kwara State in the sub-Saharan African region, with the aim of contributing to the process of creating a conducive policy environment for acceptance, development and application of ICT. The purpose of this research was therefore to assess the current state of ICT infrastructure in these 12 rural communities and explore gaps in ICT infrastructure and its application for development in businesses, education, health, agriculture and other areas.

Literature review

Rural communities

Rural is a term that can be defined based on different concepts such as the geographical concept, a location with identifiable boundaries on a map, or whether it is a

social representation, a community of interest, a culture and way of life (Halfacree 1993). In various studies on rural areas, the definition has been predominantly predicated on the population size or density of a settlement (North, Smallbone, and Baldock 1997, 2000a, 2000b). Rural areas are defined as 'sparsely populated lands lying outside urban areas' (Statistics Canada 1999, 226). The Organization for Economic Cooperation and Development (1996), describes rural communities as communities where individuals are less than 150 persons per square kilometre. This includes individuals living in the countryside, towns and small cities inside and outside the commuting zone of larger urban centres. According to Weisheit and Wells (1996) in their study, the demography of an area represents just one of four dimensions of the meaning of rurality. The demographical classification comprises variables such as population density and settlement size, which describes the area in physical terms and provides objective, measurable criteria for classification. The economic dimension relates to the activities engaged in by the dwellers that translate into economic power. These include farms, cows and animal rearing. Rural communities are often classified as 'information poor', that is, they lack access to information vital to their lives and livelihoods. The rural poor depend primarily on agriculture and auxiliary activities for their livelihoods since agriculture provides the bulk of their income and nutrition (IFAD 2001).

ICT in rural development

The term Information and Communication Technology (ICT) covers any equipment or interconnected system of equipment that includes all forms of technology used to create, store, manipulate, manage, move, display, switch, interchange, transmit or receive information of various forms electronically (Field 2003). Rural people constitute the greater part of the population in developing countries and are beset with numerous developmental challenges. Application of ICT in rural development is low and slow due to low levels of ICT knowledge and technical know-how among agency officials working in rural communities and a corresponding lack of ICT infrastructure (Kumar and Singh 2012; Tripathi, Singh, and Kumar 2012). In addition, it seems that the innovation characteristics of the ICTs affect their diffusion and practical use (Freeman and Mubichi 2017).

Albert Waterson as cited by Cohen (1987, 23) pointed out that the purpose of rural development is to improve the standard of living of the rural population. Therefore, finding a solution to these developmental challenges calls for creation of a knowledge community through an information revolution. An information revolution would ensure that knowledge of and information on important technologies, methods and practices are available at the right time and in the right hands. Access to the right knowledge, information and technology can empower rural people to address developmental issues they face.

Chieme et al. (2017) argue that the integration of rural communities through teaching, as well as training on how ICT packages can enable them to solve specific problems, could be important in the development of rural areas;

however, basic facilities must first be in place to engender the needed development. In line with this, Chieme et al. (2017) recommended that relevant government agencies and non-governmental organizations (NGOs) should establish ICT centres that will aid the training and integration of rural dwellers with the outside world for knowledge acquisition. Nigeria is an example of a country that has experienced the benefit of ICT in the area of education (Ibrahim 2019), health (Ejemeyovwi, Osabuohienand, and Osabohien 2018) and agriculture (Bamigboye and Ademola 2018).

Knowledge and information are essential for facilitating rural development which eventually leads to changes in the economic and social status of the rural dwellers in these communities. Rural communities require information on supply of farm produce, new farm technologies, early warning systems (e.g. related to drought, pests or diseases), credit, competitive market and potential customers. Improved systems for management and communication of agricultural information can help poor farmers make informed choices about opportunities and constraints associated with agricultural development strategies (FAO 1998). Therefore, there is the need to connect rural communities, research and extension networks to aid in providing access to the much needed knowledge, technology and services (Forno 1999). The power of knowledge for development can be greatly enhanced by ICT if harnessed to improve access and break down barriers because while education develops cognitive skills, information gives content to knowledge (UNDP 2001, 35). ICT has the potential to enhance access to knowledge and information in rural communities by facilitating information generation, sharing and utilization amongst rural dwellers (Ajijola 2007). The use of mobile phones in Nigeria, as an example, has helped to reduce rural isolation and make communication with the outside world easier. For instance, farmers can access information on market prices and workers can also get information on available jobs and wages (Munyua 2000).

Success of ICT in rural communities

A number of projects have been undertaken in different countries across the globe to examine the success of ICT in rural communities and its contribution to rural development. Studies show success of ICT tools alongside the traditional media in delivering information. Print, video, television, film slides, pictures, dance, folklore, drama, group discussions, meetings, exhibitions and demonstrations are used to speed up the flow of information. ICT tools could be used together with traditional media for the successful delivery of information to the rural population (Munyua 2000).

The implementations of the various ICT projects have recorded success stories around the globe, both in the developed and developing countries. The International Fund for Agricultural Development (IFAD) supported an internet-based system in Latin America and the Caribbean. The internet system assisted the rural communities to access agricultural, market and technical information. Facilities for knowledge and information exchange were provided via electronic conferencing, email, databases

and a website. Another internet project (1994–1997) titled ‘Comunicacion Para el Desarrollo en America Latina’ was funded by the Government of Italy. The essence of this project was to develop a national communication system in Latin America that would enhance the knowledge and skills of small subsistence farmers. The outcome of this project proved successful and soon spread throughout the region and beyond to China, Mali, Indonesia and the republic of Korea (Balit 1998). An evaluation of the internet project indicated that it was appropriate and cost effective for the farmers. Farmers were the main beneficiaries of training and information activities while intermediaries and extension workers acquired more knowledge, skills and experience to train farmers and provide them with technical information. All the stakeholders involved in this project had access to better communication tools and information which facilitated transfer of knowledge and skills to the wider community.

An ICT project was undertaken by Fantsuam Foundation in Kafanchan, Nigeria, to give local communities in Nigeria access to health and educational resources via the internet. Fantsuam Foundation is an NGO founded in 1996 by a group of Nigerian professionals. The goal of the project was to increase access, particularly for women, to ICTs. Fantsuam facilitated ICT training and equipment upgrading in three community learning centres (CLCs) and one mobile community telecentre, all in rural communities in the southern Kaduna area of Nigeria. Basic IT training for frontline health workers, students and health trainers was provided. This computer-assisted training enabled different groups to adapt or translate health information from the internet into information that is appropriate to the local community. Health information is of prime importance to the rural community. ICT tools have been used to deliver healthcare (telemedicine) as a way of educating people on health issues in Nigeria (Obayelu and Ogunlade 2006). Preventive measures against the Ebola virus, acquired immune deficiency syndrome (AIDS) and incidents of bird flu have been communicated to the poor through television, internet, radio and posters (Obayelu and Ogunlade 2006).

Challenges in Assessing impact of ICT

To be meaningful, the impact of ICT on poverty reduction must be measured alongside other developmental goals. Therefore, strong linkages need to be established between direct ICT interventions and national local programmes that deploy ICT as an enabler in development (UNDP 2001). An approach using ICT as a tool for poverty reduction has to be broad based and tailored to various sectors.

The impact of ICT on rural communities must be viewed holistically in determining its positive influence on development. ICT tools must be utilized in such a manner as to meet the basic needs of the rural communities. This is in line with Ajijola (2007) who stated that ICT initiatives and related policies must support government in achieving the goals of National Economic and Empowerment Strategies (NEEDS): wealth creation, employment generation, poverty eradication and value

reorientation. This should be the hallmark for ICT in sustaining development.

ICTs are also seen as a critical resource in the promotion of socio-economic development with the potential to alleviate poverty (Gopalakrishna 2005). The strategic use of ICTs for poverty reduction will depend on developing the appropriate infrastructures to enable economic development and appropriate information content for necessary social and human development to occur. Despite the vast benefits derivable from the utilization of ICT, there are milestone challenges that are problematic in terms of the acceptance and usage of ICT tools in rural communities. These are major constraints which need to be tackled before the full realization of ICT benefits to the rural communities can be achieved. These include initial huge capital investment for hardware and software; reliance on physical infrastructures (electricity, telecommunications) and – even when such facilities are in place – difficulties arise when they are poorly maintained; dependence on skills and capacity necessary to use, manage and maintain the technology effectively; and the fact that majority of information exchanged via ICT – whether in text format or broadcast orally – is in the language of the developed countries. Therefore, there is the need to address the language and cultural barrier in ICT through significant investment and support for local content in broadcasting, internet and software design.

Millennium/Sustainable development goals

The Millennium Development Goals (MDGs) began with ideas from the Millennium Declaration of the United Nations and International Development Targets known as IDTs. The IDTs targeted poverty reduction, universal primary education, elimination of gender disparity, reduction of maternal mortality, infant mortality and death rate of children under the age of five years, availability of reproductive health services through primary healthcare system and sustainable development without environmental degradation. The United Nations Millennium Declaration of September 2000 speaks of values and principles, peace, security and disarmament, development and poverty eradication, protection for our environment, human rights, democracy and good governance, protecting the vulnerable, meeting the special needs of Africa and strengthening the United Nations. Several subjects were mentioned in this declaration, which include the need for freedom to the people, equality in position and gender, solidarity, tolerance of belief, language and personality, respect for nature and its preservation, shared responsibility, respect for rule of law, stopping the spread of and providing necessary assistance to people living with HIV/AIDS.

The MDGs which emanated from the ‘United Nations Millennium Declaration and International Development Targets’ focus on three major areas of human development: encouraging human capital, improving infrastructural development especially in developing nations, and increasing economic, political and social rights, while improving the basic standard of living. The focus for infrastructure includes the provision of safe drinking water, energy, information and communication technology,

increasing farm outputs and all the means of transportation. The third area of focus is empowering women, ensuring equal access to public services and increasing security of property rights. The role of developed countries in aiding developing countries was also addressed.

ICT components and the development goals

According to Hilde (2010), ICT is playing a significant role in achieving the MDGs and, as mobile phones are known to be the most widely used ICT component in developing countries, expanding mobile phone coverage needs government support. Private sectors and companies directly involved in ICT component manufacturing need to be stimulated and subsidized by government to increase the production and deployment of ICTs to developing countries in order to promote their use.

During the 14th African Union summit held in early 2010, a paper presented on 'ICT for Development' highlighted components that can be accessed by the rural communities in Africa. The mobile phone and its services such as SMS, mobile banking, alert system and weather alerts were identified. Education, health and government services, and internet access were also highlighted. Okwubunne et al. (2014) identified mobile phones, computers and internet as ICT components whose use and penetration should be measured according to the goals of the MDGs. However, Hilde (2010) quoted panelist, Adrie-Beulens, who said, 'people need information with value and the ability to act on it, otherwise a mobile is just a gadget.' This suggests that other ICT components such as television sets, radios, and computer training centres should be considered in the assessment of ICT use and penetration in order to obtain a more rounded view about ICTs in communities. These ICT components such as mobile phones, computers, internet, television sets, radio and computer training centres are found in rural communities and these ICT components require infrastructure such as bandwidth for internet access, television satellites, telecommunication masts, and buildings to house the computer training centres.

By 2015, the MDGs dovetailed into the Sustainable Development Goals (SDGs) and 17 goals for the year 2030 became operational. It is widely recognized that ICTs are important for the attainment of the SDGs by 2030. For instance, in the '2017 Huawei ICT Sustainable Development Goals Benchmark' report, it was found that goals with higher ICT correlation include SDG 9: Infrastructure, Industrialization and Innovation, SDG 4: Quality Education and SDG 3: Good Health and Well-being. The conclusion was reached that these may be the areas with the greatest potential for leveraging ICT for sustainable development (Huawei 2017). Particularly, the International Telecommunication Union (ITU) recognizes that

ICTs are able to achieve results at a scale, speed, quality, accuracy and cost not imaginable just a decade ago. They are means to deliver quality goods and services in the areas of health care, education, finance, commerce, governance and agriculture, among others. They help to reduce poverty and hunger, boost health, create new

jobs, mitigate climate change, improve energy efficiency and make cities and communities sustainable. (ITU 2018)

Also, recognition of the importance of ICTs for the SDGs led to the development of an online course: *Tech for Good: The Role of ICT in Achieving the SDGs* by UNESCO and the Brazilian Network Information Centre's Regional Centre for Studies on the Development of the Information Society (Tech for Good 2019).

ICT and rural communities

A rural community is typically a small town with lots of farms, cows and other animals indicating that the area has lots of farmers and not many people live in a rural community. Rural communities are often classified as 'information poor' because they lack access to information vital to their lives and livelihoods. The rural poor depend primarily on agriculture and auxiliary activities for their livelihoods since agriculture provides the bulk of their income and nutrition (IFAD 2001).

The end product of ICT is to generate relevant and appropriate knowledge or information. This is seen as a vital ingredient to development (Balit 1998). There is the need to connect rural communities, research and extension networks to aid in providing access to the much needed knowledge, technology and services (Forno 1999). Improving systems for management and communication of agricultural information can help the poor farmers make informed choices about opportunities and constraints associated with agricultural development strategies (FAO 1998) and could in turn help with effective production outcome.

ICTs have the potential to enhance access to information and communication resources for remote rural areas and poor communities. Citing Nigeria as an example, mobile phones use has helped to reduce rural isolation and make communication with the outside world easier. Knowledge and information are essential for facilitating rural development and eventually lead to changes in the economic and social status of the rural dwellers in the communities.

One of the ways of responding to the needs of the local people is through the utilization of 'Talking books', also referred to as audio books or e-books. Talking books are affordable and durable audio devices designed specifically for people who cannot read and write or for those who prefer to listen. The talking books are used to record information about agriculture, health, education and other areas that could be of immense benefit to the rural communities. In essence, vital information which serves as an input to development is shared among the rural communities through the aid of this audio device. In 2015, an entrepreneur in Nigeria started a business based on publishing and selling audio books (Talking Bookz 2015).

Some constraints that may be encountered in the process of introducing ICT tools must be highlighted. These are major constraints which need to be tackled before the full realization of ICT benefits to the rural communities. The constraints are:

- Initial huge capital investment for hardware and software.

- Reliance on physical infrastructures (electricity, telecommunications) and even when such facilities are in place difficulties arise when they are poorly maintained.
- Dependence on skills and capacity necessary to use, manage and maintain the technology effectively.
- The majority of information exchanged via ICT whether in text format or broadcast orally is in the language of the developed countries. Therefore, there is the need to address the language and cultural barrier in ICT through significant investment and support for local content in broadcasting, internet and software design.

As a way of addressing the above mentioned challenges, Drake (2001) advocates that rural development plans should be designed to incorporate the following:

- Building national and regional internet backbones and community access points.
- Adopting enabling policies for telecommunications and electronic commerce.
- Undertaking education and training programmes for ICT usage.
- Encouraging the creation and dissemination of locally relevant content and applications that fit the cultural and social context, reflecting the linguistic diversity.
- Creating a facilitative environment to access ICT by civil society, the private sector and government.

ICT for sustainable development in rural communities

A number of projects have been implemented in different countries across the globe to examine the impact of ICT on rural communities and the extent to which this technology had been able to contribute to rural development. Okon (2015), in the study which focuses on the Niger Delta region of Nigeria, attributes the cause of failure in ICT for development initiatives in Africa to what is called a 'misfit' with socio-cultural context during implementation, and found technology not to have an independent determinative existence. Based on statistics, one can determine the impact of ICT on rural communities. An impact analysis approach will achieve the following: monitoring the use of ICT, measuring the impact of ICT and evaluating the developmental impact of ICT programmes and projects.

There have been several initiatives globally and nationally as regards the application of ICT for sustainable development in rural areas. These initiatives have assisted several ICT projects especially in the area of funding. Some of these initiatives include the International Telecommunication Union (ITU) development group charged with ICT development and increased penetration; the United Nations ICT Taskforce which focuses on many aspects of ICT and sustainable development; and the Development Gateway Foundation supported by the World Bank which has also generated vast information on ICT and developmental issues. ICT has been deployed to Europe, Asia and Africa. Numerous countries have benefitted from these initiatives, including Bangladesh, India, Chile, Mauritius, Peru, Mexico, South Africa, Uganda and Nigeria, to mention just a few. Munyua (2000) in his article titled 'The role of ICT in rural development and food security' highlighted some

areas where ICT could play a catalytic role in developing rural areas such as: decision-making process, market outlook, employment, rural empowerment, and targeting marginalized groups.

Therefore, the impact of ICT on poverty cannot be evaluated in its entirety; it must be measured alongside other developmental goals. ICT activities as a significant rural development initiative towards becoming an information-rich society are seen as key elements to poverty alleviation and sustainable development. Information is important because while it allows access to knowledge, education and training are seen to focus on cognitive skills (Oju and Onyebuka 2016). However, strong linkages need to be established between direct ICT interventions and national-local programmes that deploy ICT as an enabler in development (UNDP 2001). An approach using ICT as a tool for poverty reduction has to be broad based and tailored to various sectors.

In a study carried out in India, Jamaica and South Africa, the effectiveness of ICT in combating poverty depended on the following factors:

- (i) Complementarities with other local level poverty reduction and development initiatives.
- (ii) Response to the local community needs.
- (iii) Involvement of stakeholders in application development.

This review has highlighted some successes in the implementation and usage of ICT tools globally to aid rural development. The impact of ICT in addressing developmental needs (food, poverty reduction, health matters, education, and transportation) is commendable even in the face of various challenges. However, in Nigeria, there has been little empirical evidence of the benefit of ICT despite the potential of ICT tools in enhancing daily lives, and access to information relevant to the economic livelihood of rural dwellers.

Despite the vast benefits derivable from the utilization of ICT, there are constraints to the acceptance and usage of ICT tools among rural dwellers in their various communities. This research work identifies these constraints and suggests ways of addressing them in the selected rural communities. This research also identifies the various ICT tools and traditional media that are already in use by these rural dwellers and determines to what extent these tools have contributed to development. The challenges posed by the usage of these ICT tools in the selected rural communities are also identified.

Methodology

Kwara State of Nigeria as study area

Kwara State was created on 27 May 1967, when the then Federal Military Government divided the four regions that then constituted the Federation of Nigeria into 12 states. At its creation, the state was made up of the former Ilorin and Kabba provinces of the then Northern Region. It was initially named the West Central State but later changed to 'Kwara', a local name for the River Niger. With a population of 2,365,353 (NPC 2006) and an area of 36,825 km² the state's distribution of population

among the local government showed an average density of sixty-three persons per square kilometre. Kwara is an averagely populated state in Nigeria and currently has about 4000 settlements of varying sizes and structures dotted on its landscape. Apart from Ilorin which is the state capital, only Offa, Omu-Aran and Oro can truly be classified as urban. These places collectively accommodate more than thirty percent of the state's population which makes more than sixty percent of the state rural. The state is presently divided into three senatorial districts comprising Kwara North, Kwara Central and Kwara South (<http://www.onlinenigeria.com/links/kwaraadv.asp>).

Study sample and sampling technique

This study used survey design to determine the state of ICT infrastructures and facilities available to rural dwellers in specific sub-Sahara African communities. The sample cut across the three senatorial districts in Kwara State, namely Kwara North, Kwara Central and Kwara South. The three senatorial districts were used in the survey in order to ensure geographical spread and representativeness of the sample. Sixteen local government areas (LGAs) cut across the three senatorial districts and two LGAs were randomly selected from each senatorial district. The LGAs selected were Asa and Ilorin South for Kwara Central; Edu and Moro for Kwara North; and Isin and Oyun for Kwara South. From each local government area, two rural communities were randomly selected and 125 respondents based on availability were expected to be sampled from each community. This resulted in the targeted sample size of 1500 respondents.

Data was collected from respondents with the aid of a structured questionnaire. The questionnaire had four sections. Section A comprised demographic variables – sex, educational qualifications, age and occupation. Section B had questions on the use, ownership, type and availability of ICT facilities such as computers, mobile phones, radio sets and televisions. Section C was used to collect information on the tasks the ICT facilities were being used for, the location and resources being used or provided by cybercafés and business centres, and internet use. Section D was used to elicit extra information from respondents on the social and economic impact of ICT facilities in their personal life. This section was limited

to the computer, internet, telephone, radio and television. As part of the data collection in the communities, the researchers were required to observe and note the deployment of telecommunication masts, satellite dishes and other ICT facilities of interest. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) to produce percentages from frequency distribution and cross-tabulation.

Data presentation and findings

The data analyzed are presented in tables using appropriate sub-headings. Three senatorial districts were used for this study and a total of 1475 useable questionnaires were reported; the breakdown is as shown in Table 1. Kwara North is reported to have 494 respondents making 33.5% of the sample, while Kwara Central had 481 respondents accounting for 32.6%, while Kwara South had 500 respondents at 33.9% of the sample.

Two LGAs were selected from each senatorial district, making a total of six LGAs. Asa Local Government Area had a total response of 294 (19.9%), Edu Local Government Area with 250 respondents (16.9%), Ilorin South Local Government Area having 187 respondents (12.7%), Isin Local Government Area having 250 respondents (16.9%), Moro Local Government Area with 244 respondents (16.5%), and Oyun Local Government Area having 250 respondents (16.9%).

Twelve communities were used for the study. Ago-Oja and Ogbondoroko are communities within Asa Local Government Area which are reported to have 116 respondents (7.9%) and 163 respondents (11.1%), respectively. Patidzuru, Dumagi, Malete, Edidi, Irra, Isanlu-Isin and Ojoku are communities within the sub-Sahara Africa region having 125 respondents each (8.5% each). Olooru is reported to have 119 respondents amounting to 8.1% of the sample, Ilota has 122 respondents (8.3%) and Oje a community within Ilorin South Local Government Area has the lowest number of respondents of 80 (5.4%).

Table 2 shows the demographic profile of the respondents. It shows 54.1 percent of the respondents are male and 45.5 percent are female, with 0.4 percent not indicating their gender.

As expected, the educational qualifications of the respondents were low. Respondents with a secondary school certificate had the highest response of 29.4

Table 1: Communities used for the study.

Senatorial Districts	Frequency/Percentage	LGAs	Frequency/Percentage	Communities sampled	Frequency/Percentage
Kwara North	494/33.5%	Edu	250/16.9%	Dumagi	125/8.5%
		Moro	244/16.5%	Patidzuru	125/8.5%
Kwara Central	481/32.6%	Asa	294/19.9%	Malete	125/8.5%
				Olooru	119/8.1%
		Ilorin South	187/12.7%	Ogbondoroko	163/11.1%
				Ago-Oja	116/7.9%
Kwara South	500/33.9%	Isin	250/16.9%	Ilota	122/8.3%
				Oje	80/5.4%
		Oyun	250/16.9%	Isanlu-Isin	125/8.5%
				Edidi	125/8.5%
				Ojoku	125/8.5%
				Irra	125/8.5%

percent, followed by those with a primary school certificate at 26.6 percent and respondents with no educational qualification comprised 25.0 percent of the sample. Respondents with an Ordinary National Diploma (OND) accounted for 6.0 percent while those with a Bachelor degree or an HND accounted for 5.2 and 3.2 percent, respectively. Respondents with Quranic education were found to comprise 2.9 percent of the sample, while those with a Master's degree, a postgraduate diploma or a PhD made up the lowest proportion of the sample at 0.5, 0.3 and 0.1 percent, respectively. Also, 0.8 percent of the sample did not respond to the question.

Respondents aged between 21 and 30 years made up the largest proportion of the sample at 28.1 percent, followed by those aged between 11 and 20 at 23.6 percent, and those aged between 31–40 accounting for 16.5 percent. Respondents age of 41–50 accounted for 11.7 percent. Respondents aged above 50 accounted for 19.5 percent of the sample, and 0.6 percent did not respond to the question.

Regarding the occupation of respondents, students and business men/women had the highest response rate at 31.1 and 21.4 percent respectively, followed by civil servants and public servants comprising 12.8 percent of the sample, while 17.3 percent were farmers and 10.3 percent were artisans. Politicians accounted for 1.0

percent of the sample while other occupations accounted for 5.3; 0.9 percent did not respond to the question.

Availability of ICT infrastructures in the communities

This study further noted the presence of ICT infrastructural facilities such as the deployment of telecommunication masts, solar electricity installations and satellite dishes in the visited communities. Out of the two communities visited in Ilorin South Local Government Area, Oje community had no ICT infrastructure on the ground. One telecommunication mast and five DSTV dishes were identified in the second community called Ilota.

Ogbondoroko in Asa Local Government Area recorded no mast; however, 15 DSTV dishes were seen, while Ago-Oja also in Asa Local Government Area had 6 DSTV dishes visible in the community.

Isanlu-Isin, a community in Isin Local Government Area was found to have a computer system within the palace of the King, which was connected to the internet through the Globacom internet service providers. The community was seen to have three different masts of different mobile networks (Glo, Mtn and Zain), while Dish and other ICT installations were also seen in the community. Edidi was found to have masts of different mobile networks. It was also found to have an ICT facility and solar electricity undergoing installation in one of the secondary schools within the community.

Ojoku in Oyun Local Government Area was found to have only two masts (Glo and Mtn) and a computer business centre while Irra was found to have two different masts (Mtn and Zain).

Dumagi, Patidzuru, Malet and Olooru are communities in Edu and Moro Local Government Areas. Mobile telecommunication service masts and football/film viewing centres were found in all four communities visited. Phone call centres also referred to as business centres were also seen in all the communities. Computer centres were seen at Olooru and Malet with only one computer system and printer at the centre. Satellite dishes for subscription-based TV service and free-to-air service were also seen. The dish sizes ranged from 45 cm to 2.6 metres.

ICT facilities and infrastructures use by rural dwellers

Table 3 reveals that only a few of the rural dwellers have access to and use computer systems. Only 28.3 percent of respondents were found to use computer systems, while 71.7 percent did not. Mobile phone penetration in the selected rural communities in the study was very high as results show that 82.9 percent use mobile phones, while only 17.1 percent did not. The result also shows that radio sets are one of the early ICTs that are widely spread especially among rural dwellers in rural communities within the sub-Saharan African region. Respondents who use radio sets accounted for 79.8 percent, while 20.2 percent claimed not to use radio sets. Television set usage accounted for 72.1 percent within the sample, while those that do not use television sets comprised 27.9 percent of the sample. A little above half the respondents (53.4%) claimed to use video players, with 46.6

Table 2: Demographic profile of respondents.

Demographic variables	Frequency	%
<i>Gender</i>		
Male	798	54.1
Female	671	45.5
No response	6	0.4
<i>Educational Qualification</i>		
None	369	25.0
Primary School Certificate	393	26.6
Quranic	43	2.9
Secondary School Certificate	433	29.4
OND	89	6.0
HND	47	3.2
Bachelor Degree	76	5.2
Master	8	0.5
Post Graduate Diploma	4	0.3
PhD	1	0.1
No response	12	0.8
<i>Age</i>		
11–20	348	23.6
21–30	414	28.1
31–40	244	16.5
41–50	173	11.7
51–60	130	8.8
61–70	103	7.0
71 and above	54	3.7
No response	9	0.6
<i>Occupation</i>		
Student	458	31.1
Civil Servant	169	11.5
Public Servant	19	1.3
Politician	15	1.0
Business Person	315	21.4
Artisan	152	10.3
Farmer	255	17.3
Others	78	5.3
No response	14	0.9
Total	1475	100.0

percent saying they did not. All other listed ICT facilities were used by only a few of the respondents.

On ownership, Table 4 shows that ownership of mobile phones was very high at 84.5 percent, followed by radio sets at 70.5 percent and TV sets at 59.2 percent. Ownership of video players was found to be 41.4 percent, tape recorder with 25.0 percent and computer system at 11.0 percent. Other ICT facilities such as scanners, printers, photocopying machines, close circuit television, satellite television, VSAT, fax machines and gaming devices were found to have low response. While satellite television was the highest among the least owned ICT facilities by the rural dwellers, the study found DSTV to be the most popular satellite television viewed by the rural dwellers in the rural communities among other satellite televisions such as HITV, MyTV and the free satellite television. This could be due to the outreach the South African owned satellite television (DSTV) on the African continent.

Accessibility to ICT facilities and infrastructures

Table 5 shows the ICT facilities that can be accessed by the rural dwellers. More than 83 percent of the rural dwellers do not have access to any cybercafé. However, more than 50 percent of the respondents have access to a call centre, a TV viewing centre and a computer business centre. Furthermore, 35.3 and 35.0, percent, respectively have access to a computer training centre and a game centre. In Table 6, the result shows that a very small number of respondents were found to use cybercafés daily (1.7 percent). Call centre was reported as having a high frequency of usage (51.5 percent). Computer business centre, game centre and TV viewing centre also had low rate of use even though they were available.

ICT applications and facilities

Table 7 shows the applications and facilities that are used by the rural dwellers. These applications and tools are being accessed using different facilities. The table shows the use of these applications and facilities using the respondents' personal computers, cybercafés and computer business centres. The results show that a high

Table 4: Ownership of ICT facilities.

	Frequency	%
Computer system	162	11.0
Mobile phone	1247	84.5
Radio set	1040	70.5
Television set	873	59.2
Scanner	69	4.7
Printer	73	4.9
Photocopying machine	52	3.5
Close circuit television	43	2.9
Satellite television	107	7.3
Digital camera	175	11.9
Video player	610	41.4
Tape recorder	369	25.0
VSAT	37	2.5
Fax machine	32	2.2
Gaming device (PS2, PS3, PSP, Xbox)	94	6.4

number of respondents use their personal computer to access word processing and spreadsheet applications, keep records and browse the internet. The use of personal computers for personal purpose as shown in Table 7 reveals that word processing ranks second with 16.7 percent and computer video games was highest at 18.5 percent. The least activities that personal computers were used for were found to be Data analysis (9.1%), Internet telephoning (7.3%) and presentation activities (7.9%).

Table 7 reveals that more than 90 percent of the respondents do not use word processing in a cybercafé or business centre. Out of the few respondents that use cybercafés and computer business centres for services, multimedia projector was ranked first at 7.1 percent, internet browsing ranked second at 6.5 percent, social networking at 5.1 percent, computer games and word processing closely followed at 4.9 and 4.7 percent, respectively. Spreadsheet (3.1%) is the task that computers were used for least in cybercafés.

Table 8 shows the tasks the internet is used for by the rural dwellers. Out of all the mentioned resources provided by the internet, 'browsing to while away time' was found to be highest at 13.9 percent; this was closely followed by email at 13.2 percent. The tasks that ranked lowest were social networking at 9.6 percent and video conferencing having 5.8 percent.

In Table 9, 'receiving calls' was the highest (89.8 percent) among the tasks that mobile phones are used for by rural dwellers. This was closely followed by 'making calls' at 88.5 percent. Text messages, alarm and

Table 3: Use of ICT facilities.

	Yes		No	
	Frequency	%	Frequency	%
Computer system	417	28.3	1057	71.7
Mobile phone	1223	82.9	252	17.1
Radio set	1177	79.8	298	20.2
Television set	1064	72.1	411	27.9
Scanner	152	10.3	1323	89.7
Printer	207	14.0	1268	86.0
Photocopying machine	244	16.5	1231	83.5
Close circuit television	88	6.0	1387	96.0
Satellite television	268	18.2	1207	81.8
Digital camera	208	14.1	1267	85.9
Video player	788	53.4	687	46.6
Tape recorder	484	32.8	991	67.2
VSAT	72	4.9	1403	95.1
Fax machine	60	4.1	1415	95.9
Gaming device (PS2, PS3, PSP, Xbox)	197	13.4	1277	86.6

Table 5: ICT facilities accessible to rural dwellers.

	Yes		No	
	Frequency	%	Frequency	%
Cybercafé	243	16.5	1232	83.5
Call Centre	960	65.1	515	34.9
TV Viewing Centre	819	55.5	656	44.5
Computer Business Centre	762	51.7	713	48.3
Computer Training Centre	520	35.3	955	64.7
Game Centre	516	35.0	959	65.0

Table 6: Frequency of use of ICT facilities by rural dwellers.

	Never		Sometimes		Once a week		Daily	
	N	%	N	%	N	%	N	%
Cybercafé	1236	83.8	171	11.6	43	2.9	25	1.7
Call Centre	716	48.5	536	36.3	80	5.4	143	9.7
TV Viewing Centre	945	64.1	304	20.6	133	9.0	93	6.3
Computer Business Centre	966	65.5	393	26.6	69	4.7	47	3.2
Game Centre	1146	77.7	212	14.4	46	3.1	71	4.8

Table 7: ICT applications and facilities used by rural dwellers.

	Computer Business Centre Frequency/Percentage	Cybercafé Frequency/Percentage	Personal computer Frequency/Percentage
Word processing	86/5.8	70/4.7	246/16.7
Spread sheet	76/5.2	45/3.1	151/10.2
Data analysis	73/4.9	50/3.4	134/9.1
Presentation	67/4.5	52/3.5	116/7.9
Records keeping	67/4.5	59/4.0	169/11.5
Internet browsing	59/4.0	96/6.5	175/11.9
Internet telephoning	44/3.0	63/4.3	108/7.3
Social networking	49/3.3	75/5.1	145/9.8
Computer video games	63/4.3	73/4.9	277/18.5
Multimedia projector	105/7.1	90/6.1	0/0

calculator were found to be high at 70.8, 62.8 and 62.5 percent respectively. While some respondents use their mobile phones to listen to news, music, organize their schedules, play games, watch movies, internet browsing was found to be the lowest at 27.3 percent.

Table 10 reveals that more than 60 percent of the respondents listen to news, music, announcements, advertisements and entertainment on both radio and television. While radio was found in this study to have a wider coverage and was used for different tasks in the rural communities of sub-Saharan Africa than television, 'education and learning' as a task is seen to be used less with radio and television although, having more than 50 percent respondents.

Table 11 shows the preference for local content on both radio and television far outweighs that of foreign content. This indicates the familiarity and understanding of the local content compared to the foreign which is not surprising for rural dwellers.

Discussion of findings

This study which used 12 rural communities within the sub-Saharan African region of Kwara State in Nigeria had a total of 1475 respondents in the study sample. The responses are used to discuss ICTs among the rural dwellers in the study communities. These communities comprised people from different tribes such as the Fulani, Hausa, Nupe and Yoruba. These tribes represent some of the well-known tribes within the sub-Saharan African region.

Demographic characteristics of respondents

The study presented the demographic profile of the respondents which influenced the ownership and use of ICT facilities among the rural dwellers. These demographic variables were gender, educational qualification, age and occupation. Males (54.1%) had a higher proportion of the sample than females (45.5%). The male participants were more easily accessible than the females in these communities. This could be due to the involvement

Table 8: Functional use of the internet.

	Frequency	%
E-mail	195	13.2
Chatting	148	10.0
Social network (Blog, Wikies, Facebook, Twitter)	142	9.6
Video conferencing	86	5.8
Information search	184	12.5
Games	176	11.9
Videos	179	12.1
Music	176	11.9
Pictures	191	12.9
Getting news (current affairs, sports)	184	12.5
Advertisement	155	10.5
Browsing to while away time	205	13.9

Table 9: Functional use of mobile phone.

	Frequency	%
Making calls	1306	88.5
Receiving calls	1325	89.8
Text messages	1045	70.8
Internet browsing	403	27.3
Games	789	53.5
Listening to radio	826	56.0
Listening to music	774	52.5
Getting news	584	39.6
Photography	624	42.3
Video	554	37.6
Data transfer facilities	448	30.4
Calculator	922	62.5
Alarm	927	62.8
Organiser (Notice, reminder, calendar)	782	53.0

Table 10: Functional use of the radio and television.

	Radio		Television	
	Frequency	%	Frequency	%
News	1273	86.3	1010	68.5
Music	1243	84.3	932	63.2
Announcement	1219	82.6	887	60.1
Entertainment	1128	76.5	1002	67.9
Education and learning	948	64.3	796	54.0
Advertisement	1163	78.8	900	61.0

of females in day to day activities that are mainly outside their household.

About half of the respondents (51.7%) were between the ages of 11 and 30 years, and is in line with the burgeoning youth population of Africa which is known to have the youngest population in the world (Yahya 2017). Some have suggested that the enthusiasm with which youths interact with ICTs should be harnessed for future development of Africa (Eziakonwa 2019). Only about 10 percent of the participants were senior citizens in the age range of 61 years and above.

The study found five participants with higher educational qualifications. This could be attributed to the practice of some highly educated people who return to their communities to assist in one programme, project or the other by providing expertise and assistance to their community. The study also found that more than 40 percent of the respondents had a minimum of a secondary school certificate. This could be due to awareness within Africa and other developing countries of the need to be educated to improve economic conditions and livelihood.

Students (31.1%), business persons (21.4%) and farmers (17.3%) were identified in the sample. This spread reflects the age group found in the study where more than half of the sample were younger than 30 years old. It is, however, surprising there are more business persons than farmers. This reflects the growing reluctance of rural dwellers to engage in farming, preferring other means of livelihood to the toil of subsistence farming.

Ownership of ICTs

Regarding ownership of ICTs, this study found that among rural dwellers the mobile phone had the highest ownership and usage rate of all ICTs. This is similar to the finding by Freeman and Mubichi (2017) in their study of smallholder farmers in rural Mozambique. This prevalence could be attributed to the characteristics of mobile phones such as

their ease of use, compactness, and being less expensive and more functional than other ICTs. Mobile phones avail the rural dwellers the channel to communicate within and outside the community. The study also found radio and television to be among the most owned ICT tool by the rural dwellers. However, radios, just as mobile phones, are seen as companions which rural dwellers have with them at all times. They rely on the radio to get all necessary information through the news and other radio programmes. Radios and television sets are seen as a ‘must have’ by the rural dwellers as they provide the visual programmes, news and other interesting activities.

Fax machines, satellite television and CCTV are the least owned ICTs by rural dwellers. These ICTs are expensive and they are not of importance to the rural dwellers. However, most popular among the least owned ICT facilities by the rural dwellers are satellite television. The study found that DSTV was the most viewed satellite television by the rural dwellers, above HITV, MyTV and the free satellite television. This could be due to the easy accessibility of the South Africa owned DSTV satellite television services to the rural communities.

Call centres, TV viewing centres and computer business centres were found to be highly accessible to the rural dwellers. Call centres are often used by those who cannot afford to fund their mobile phone usage by topping up the credit. The TV viewing centres are a kind of business that allows a large number of people to have access to programmes that are expensive to subscribe to, while computer business centres give the rural dwellers the opportunity to use computers and other facilities needed by paying a token for the access.

Usage of ICT applications and facilities

This study also looked at the ICT applications and facilities that are most used by rural dwellers. The study found computer video game and word processing to be the applications most used on personal computers. This could indicate the ability of the rural dweller to use a keyboard with a personal computer for personal work such as assignments and job-related work. Use of video games indicates rural dwellers’ ability to work with computers and do other interesting activities. Email is the most used on the internet by the rural dwellers. This indicates their zeal to communicate with the outside world. Searching, video and picture downloads, news, games and chatting are also some of the activities the rural dwellers are involved in while surfing the internet.

This study shows rural dwellers receive more calls (89.8%) than they make (88.5%). This is due to calling centres which provide the call-making service to minimize the amount of money spent on making calls and through affordable pricing. Text messaging is an important feature of mobile phone use by rural dwellers. They also use mobile phone calculators for their personal business and the alarm keeps them alert and assists in time management. News, music, entertainment and advertisement are the items most preferred on radio and television. However, the study found that the rural dwellers prefer local to foreign content. This could be due to them understanding the local language and familiarity with the local

Table 11: Television programme preference.

	Local	Content	Foreign	Content
	Frequency	%	Frequency	%
News	1202	81.5	376	25.5
Music	1172	79.5	350	23.7
Movies	1099	74.5	365	24.7
Announcement	1170	79.3	248	16.8
Entertainment	1150	78.0	296	20.1
Education and learning	946	64.1	281	19.1
Advertisement	1143	77.5	243	16.5

tradition. A link between mobile phones with FM radio and the farmers' ability to communicate agricultural information was made by Kacharo, Mvena, and Sife (2019) in a study of rural households' use of mobile phones in Southern Ethiopia. This further confirms the finding by Freeman and Mubichi (2017) that the characteristics of the particular ICT influences its use and this linkage will be explored in future work.

Those rural dwellers who use computers for knowledge and education had the highest percentage of response (21.1%). This was followed by those who use computers for information gathering and communication with a response rate of 15.4 percent. Respondents who use computers for entertainment accounted for 9.4 percent, while the rest of the respondents noted that computers have sped up civilization, assisted them in doing business, facilitated data analysis and processing, aided documentation and development, created employment, generated revenue, and served as a tool for entertainment.

The study found that 25.8 percent of the respondents have no idea about the internet or know anything about it; hence, they could not comment on the socio-economic impact of the internet on their lives. Some of the respondents (12.3%) identified that the internet has enhanced and eased information gathering and communication. Other notable socio-economic impacts of the internet included boosted business, better learning, medium of entertainment, connecting to people and getting to know more people, and making research and transfer of documents easier.

More than one quarter of the respondents (27.3%) felt that the radio impacted their lives as a means of getting informed and enlightened. Of the sample, 12.5 percent felt that the radio had created much awareness about things happening inside and outside the country, while entertainment accounted for 18.0 percent and 8.9 percent claimed that they got to know about new products, happenings around the world, learned many new things regarding education, health, religion, and family matters and that this had changed the way they live their lives.

A high number of respondents stated that television served as a tool for entertainment, while some rural dwellers opined that television has brought about increased awareness and is a tool for information dissemination. Others believed that enlightenment provided by ICT was not as important as the socio-economic impacts of ICT such as relaxation and easing of tension, access to vital and useful information, capacity building and improved learning.

Conclusion and Recommendations

This study concludes that plans must be incorporated into the ICT policies to realize the benefits of ICT. This is because lack of a coherent and comprehensive policy often leads to redundancy, waste of resources, ineffective ICT diffusion and development and the inability to tap into global opportunities (ICT POLICY.html).

The implementation of the above rural development plans can be achieved in the following ways:

- (1) Building national and regional internet backbones: These internet backbones will help in tackling the problem of connectivity in the rural areas. The rural communities can be remotely connected to these networks via various access points. Wireless technologies which include satellite technology and VSAT (Very Small Aperture Terminals) are examples of technologies used for easy connectivity in rural communities. External and internal databases should be available sources for various types of information which will serve as input to development.
- (2) Adopting enabling policies for telecommunication especially in the area of ICT infrastructures: This will encourage Public Private Partnership (PPP), provide telecommunication infrastructures, computers and related equipment, internet connectivity, affordable internet access and ICT rural networks.
- (3) Education and training programmes for ICT usage: Continuous training programmes for trainees and trainers as regards ICT applications should be given priority. Rural communities must undertake regular training programmes to keep abreast of new developments in the application of ICT tools.
- (4) The creation and dissemination of locally relevant content: This is of prime importance in the rural development plan. This will further encourage local participation as a means of sustaining ICT for development. Local participation is a key to meeting the local needs of the rural populace.
- (5) Creating an enabling environment for ICT in the rural communities: This must facilitate access not only by civil societies, the private sector and government but NGOs and international agencies are all indispensable parties in sustaining ICT development in rural communities. Therefore, a multi-stakeholder approach is required in the design and implementation of a rural development plan.

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