



## Infrastructures As an Approach to Human Development: A Review of Use of Information Communication Technology)

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**Abstract:** *This paper presents a review of the use of Information Communication Technology (ICT) infrastructures for human development as an approach to improving peoples' general wellbeing and productivity particularly in the low human development countries. It was observed that the deployment of ICT infrastructures in governance mechanism have remarkable capability to lower human deprivation. Its provision in the forms of internet, personal computers, cloud computing, electronic mail and mobile phones as brought digital opportunity, which in turn made information and knowledge available for all seamlessly. Furthermore, its application has brought improvement in the economy, commerce, living standard, healthcare delivery and live expectancy, and access to higher education system. Finally, it has improved the way of living through the use of artificial intelligence in human daily activities. However, its use in Nigeria is bedeviled by lack of basic education and ICT skill, obsolete equipment, high cost of modern ICT equipment, epileptic electricity supply, and high cost of internet connectivity. However, it is recommended that deployment of ICT infrastructures in the governance of the underdeveloped countries will reduce human deprivation and thus bridged the gap in human development between the low human development and very high human development countries.*

**Keywords:** Infrastructure, Human development, Human deprivation, Information communication technology (ICT)

### Introduction

Human deprivation and lack to access to quality education in the poor and underdeveloped nations have led to human underdevelopment in such countries. This, in turn, has led to low human capacity, inability to secure employment and poor economic status of the affected people (UNESCO, 2002; Pritchett, 2004). Unfortunately, the situation seems to be aggravated by the slump in the global economy due largely to the lockdown occasioned by the COVID-19 pandemic. Many jobs have been lost, productivity is generally low, and more industries are folding up or are running bankrupt (Ozili, 2020). There is the need to arrest the trend otherwise, the gap between the economically deprived (i.e. low human development countries) and the rich nations (i.e. very high human development countries) will continue to widen. So also, is the deterioration of the general wellbeing of people and the reduction in the opportunities to choose and live their desired lives (Mihai et al., 2015).

This scenario is characteristic of most poor African countries including Nigeria where the economic status of the majority of the populace is low, unemployment is high, human capacity is questionable, more school-aged children are not in school, and limited access to university education, etc. (Mihai et al., 2015). For

example, UNDP Human Development Report (2019) indicated that among children born in 2000 in the low human development countries, 17% died before age 20, 80% are not in higher education, and 3% in higher education. In the very high human development countries, on the other hand, 1% died before age 20, 55% in higher education, and 44% not in higher education. To reverse the trend, therefore, the strategy for human development must be adopted in to the country. The strategy must ensure the general wellbeing of the people. That is, it provides them with ample opportunities to access education, healthcare and employment (job). Furthermore, people should be able to develop, build and use their skills and abilities in employment, and lead creative and productive lives. Indeed, the strategy must cover the basic dimensions of human development – a decent standard of living. Gross National Income (GNI) Index), long and healthy life (life expectancy Index) and knowledge (Education Index) as measured by Human Development Index (HDI). This paper presents a review of the use of ICT infrastructures for human development as an approach to improving peoples' general wellbeing and productivity.

### *Concept of Human Development*



Human development effort is perceived as a means of improving capabilities and providing opportunities for all individuals. It ensures or guarantees good health, access to knowledge, human rights, human security, decent standard of living, non-discrimination, dignity and self-determination (UNDP Human Development Report, 2016). Indeed, the development effort is to ensure the general wellbeing of the people. Gboyega (2003) and Lawal Oluwatoyin (2011) perceived development as a process of improving human existence in all ramifications. Also, Gronroos (1984) viewed development as a process of societal advancement, where improvement in the wellbeing of people is generated through partnerships among sectors, corporate bodies and other groups in the society. Consequently, development is an exercise, involving socio-economic and political issues which pervades all aspects of societal life.

Summarily, human development addresses the human needs of leading a long healthy life, of acquiring knowledge and of having access to the resources for a decent standard of living (UNDP, 2006). Also, it is defined as a process of developing the people through building human capabilities, and through active participation in the processes that shape and improve their lives. Therefore, people must influence the processes that shape their lives. It is broader than other approaches, such as the human resource approach, the basic needs approach and the human welfare approach (UNDP Human Development Report, 2016). The HDI incorporates three basic dimensions of human development highlighted by UNDP. That is, life expectancy at birth an indication of the ability to lead a long and healthy life; average years of schooling an indication of the ability to acquire knowledge; and gross national income per capita indicating the ability to achieve a decent standard of living. This concept, therefore, forms the basis of Millennium Development Goals (MDGs) adopted by UNDP to improve the level of human development in low human development nations of the world. The goals were to eradicate poverty, provide universal primary education, and promote gender equality and women empowerment. Also, they included a reduction in child mortality rate, improved health, eradication of HIV/AIDS, malaria and other diseases, environmental sustainability and global partnership for development (Chacko, 2005; Moran et al., 2008).

### ***Information Communication Technology (ICT) Infrastructures***

Information Communication Technology, ICT is a generic term referring to technologies that are used for collecting, storing, editing and passing on (communicating) information in various forms (Hawkrige, 1983). It is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite system and so on, as well as various services and applications associated with them, such as video conferencing and distance learning. Today, mobile phones, desktop computers, handheld devices, emails and the use of the Internet has become a central part of human life. These technology plays a vital role in or day to day operation and are important for sustainable development (Crede & Mansell, 199 Oji-Okoro, 2006). Thioune (2003) noted that for the past two decades most developed countries have witnessed the significant change that can be traced to ICT. In a technology-driven society, getting information quickly is important for both sender and receiver. ICTs have made it possible to quickly find and disseminate information.

On a global level, ICT infrastructures have brought communication and access to information to the forefront of development. People now form new social networks and share knowledge across geographical boundaries. Fixed-line telephony, computers, the Internet and mobile communications have become part of the daily lives of millions of people around the world, providing them with instant access to voice, video telephony, text messages, video streaming, e-mail, file and data transfer and other applications. More than 118 million PCs were installed in homes and schools worldwide by the late 1990s (WITSA, 1998). In the view of Oketunji (2000), at the heart of technology lie two main branches of technology - computer and telecommunication. The technologies covered are the computer system, internet/electronic mail (e-mail), mobile phones, and fax machine.

*Some forms of the ICTs that have helped human development includes:*



**Internet:** The internet is a global collection of many types of computers and computer networks that are linked together. It is increasingly becoming the solution to information problems, information exchange etc. The use of the Internet on human development has been shown to improve productivity, trade, business transactions, income and socioeconomic status (Litan & Rivlin, 2000; Oyelaran-Oyeyinka, 2003, Oyelaran-Oyeyinka & Lal, 2003; Mimbi & Bankole (2015). Internet penetration facilitates improvement in the standard of living. Mbarika (2002) stated that the internet is beneficial to both academic and research sectors in the least developed countries. Improvement in the health of a population, and strengthening the health system such as prevention and detection of diseases are important to development. The use of the internet has provided opportunities for health providers, media and stakeholders to disseminate health information in developing countries (Ojo, 2006; Curioso & Kurt, 2007).

**Computer:** It was originally used by scientists for calculating numbers, and have gradually become useful in offices and industries. In recent times, simplified models that can be used by almost everybody has become common in schools and homes for accomplishing many varied tasks and application (Ogbomo, Ogbomo 2008).

**Mobile Phones:** Bittner (1989) defines mobile phones as a telephone system that can move or be moved easily and quickly from place to place. The mobile phone is now one of the ICT infrastructures that is reshaping and revolutionizing communication globally.

**Cloud computing:** Initially, it was a term used to represent telephone networks and later to depict internet. It relies on shared computing resources instead of having local servers or personal devices to handle applications. Application storage and other services are accessed via the web. Cloud computing is an internet-based computing where virtual shared servers provide software, infrastructure, platform, devices and other resources and hosting to customers on a pay-as-you-use basis. That is, user access and pay for cloud computing services over the internet. All information that a digitized system has to offer is provided as a service in the cloud computing model. Cloud computing is a model used for enabling convenient, on-demand network access to a shared pool of configurable computing resources. The resources that can be released readily with service provider interaction or minimal management effort. It enables cost casing, remote networking, efficiency, flexibility, future proofing, morale boosting, and resilience without redundancy.

**Electronic Mail (e-mail):** This is the exchange of text messages and computer files transmitted via communication networks such as the Internet (Nwosu, 2004). Oketunji (2000) described e-mail as an increasingly popular method of communication, especially in the workplace. Ogbomo and Ogbomo (2008) also sees the e-mail system as the equivalent of postal mailing services, with the biggest difference being the time and cost involved. Not only written data, but all sorts of information in the form of video, audio, or photographs, can be sent via e-mail.

### **Use of ICT for Human Development**

Helmut (1998) noted that, of the technological changes that have impacted human lives in recent years, information technology has had the greatest influence. ICT has widely been applied directly and indirectly in healthcare delivery, education and human capacity building, economics and commerce, transportation and navigation, human rights and security, and governance. Most of its applications have been through artificial intelligence, AI and direct access to information. Working from home is becoming increasingly popular through the use of ICT infrastructures. Virtual meetings and video conferencing are entrenching the concept of the global village. However, an information society only makes the best possible use of ICT for human development. Supporting the view, Martin (1995) described it as a society in which the quality of life, as well as prospects for social change and economic development, depends increasingly upon information and its exploitation. In such a society, living standards, patterns of work and leisure, education system, and market place are influenced by advances in information and knowledge. This is evidenced by an increasing array of information-intensive products and services (Martin, 1988).

Annan (2002) affirmed that the information society enhances human capacity expansion, built up, nourishment, and liberation. It gives people access to tools and technologies, with education and training to see them effectively. Consequently, it can be surmised that ICT can be deployed to move human development from basic to the desired enhanced capabilities advocated in the UNDP Human Development Report (2019). Examples of achievements of basic capabilities are early childhood survival, primary education, entry-level technology and resilience to recurrent shocks. Access to quality health at all levels, high-quality education at all levels, and effective access to present-day technologies



and resilience to unknown new shocks are examples of achievements in enhanced capabilities. Meanwhile, enhanced capabilities are necessary to reduce human deprivation.

From the foregoing, the question arises as to what extent or how has the ICT supported the three key indicators measured in the Human Development Index (HDI)? The indicators are a decent standard of living (GNI Index), long and healthy life (life expectancy Index) and knowledge (Education Index).

#### ***Effect of ICT on the growth of the economy (standard of living)***

ICT plays an essential role in the economy of a nation. Mansell and Wehn (1998) noted that certain communities (knowledge societies) deployed ICT for their sustenance and development. They were able to harness the advancement in creativity and innovation in the communities. Also, Lyon (1991), Conote and Dyke (2004), and Gomez-Barrozo and Peres-Martinez (2005) averred application of ICT in an economy caused the society to transform information into a driving force giving room for great change. The significant effect of ICT on the economy was palpable in the delivery of services. In recent times, the economy of most developing countries is knowledge-based where consumers use knowledge-based goods and services (Aghael & Rezagholizadeth, 2017). ICT, therefore, influences both the demand and supply side of the economy. Furthermore, Quah (2003) believed that ICT affected consumer economic behaviour and on the supply side, it influenced producer behaviour.

Besides, ICT enter into the economic supply as input in the form of capital and caused the improvement of production process through deeping capital and making advancement in technology and labour force quality. Also, its output is value added at three levels: firm, sectoral and the national. Finally, growth in labour force productivity, profit making and consumer welfare would follow (Dedrick et al., 2003).

ICT infrastructures stimulated economic growth, production and productivity in many ways. First, ICT goods and services are part of the value added of the economy. Second is the utilization of ICT capital as input in the production of all goods and services, which will lead to economic growth. Finally, ICT can case economic growth through its contribution to technological change (Aghael & Rezagholizadeth, 2017).

If the growth of ICTs is based on the benefits of efficiency and productivity in the activities, it will lead to an increase in productivity growth at the macro-economic level (Pahjola, 2002).

The direct economic growth of ICT infrastructures can be measured as a percentage of GDP. This is done by calculating the overall returns from the delivery of services of these technologies. The revenues of ICT infrastructures is more for developed countries than developing ones and continues to increase. However, some developing countries achieve increased revenue from ICT infrastructures

#### ***Effect of ICT on Healthcare delivery (life expectancy)***

Improvement in healthcare services especially in African countries has been a major concern (WHO, 2014). The Organization considers health systems fundamental in ensuring improved citizen's welfare. Hence, the inadequate health system is believed could adversely effect on a nation's economic prospect. Consequently, health is perceived as a state of complete physical, mental and social well-being and not merely the absence of deceases or infirmity. Also, it is implied that good healthcare services ensure human longevity or life expectancy.

The possibility of deploying ICT in the health system, both in developed and developing countries has been explored (Bloom & Standing, 2005; Lucas, 2008). Indeed, the world has witnessed a significant turnaround in healthcare delivery with the emergence and application of ICT infrastructures in the health system (Qureshi et al., 2015). Health providers and hospitals now engaged in e-Heath. Kwankam (2004) described e-Health as the use of ICT in the provision of health care services. The phenomenon implied that ICT is used in various health care functions such as health education, clinical services, research and administration; regardless of the geographical settings (Kankan, 2004; Mars and Scott, 2015). Other form is healthcare delivery service introduced through application of ICT is the mobile health (i.e. m-health).

Both e-Health and m-Health can transform the health system by incorporating electronic means to delivering information and provide health related training. For example, mobile phones can be used to disseminate information regarding vaccination campaign, appointment date with physician of general practitioner, etc. (for instance, sends health related messages to



Nigerians regarding the prevention and spreading of COVID-19). The m-Health services is made possible through the use of mobile phones. It occurs through wireless telemedicine that involves the use of mobile telecommunications and multimedia technologies (Istepanian and Lacal, 2003). This mode of healthcare delivery continues to mature and has been used to address health care challenges such as access, quality, affordability, matching resources and behavioral norms through mobile technologies (Qiang et al., 2012).

### ***Effect of ICT on Education delivery (access to Knowledge and its acquisition)***

Tinio (2002) noted that ICTs aided knowledge acquisition, offering developing countries, unprecedented opportunities to enhance their educational system. These contributions and changes are majorly profound in schools and among teachers, instructors and students. Investment in ICT infrastructures for educational management is more in the advanced nations of the world where students use the computer more on a much larger range of applications (Volman, 2005). The ICT-based education portal is common in higher education institutions for the management of teaching and learning activities. The education portal is interactive, and when used in combination with video conferencing it makes possible e-learning. ICT infrastructures make possible distance learning thus extending higher education to people desiring education but are either unavailable for full-time studies are denied admission because of lack of space in the first instance. Therefore, ICT allowed widening of access to higher education via electronic and distance learning (Lucas, 2008; Qureshi et al., 2015).

Jo Shan Fu (2013) observed that the use of ICT facilities for teaching enhanced students' performance because it supports self-direct learning and students can access digital information efficiently and effectively. It supports teaching by facilitating access to course content. Furthermore, it produces a creative learning environment and offers more opportunities to develop critical thinking. Finally, it promotes collaborative learning in a distance-learning environment.

ICT enhanced the quality and accessibility of education making increase in the flexibility of delivery of education to many learners who can access knowledge anytime and from anywhere. It influenced the way students are taught and how they learn as the processes are more of learner driven and not by teachers (Noor-Ul-Amin, 2013). Earlier, Cabero (2001) had suggested that the flexibility

of time and space enabled the integration of ICT into teaching and learning processes. ICT infrastructures are tools that encourage and support independent learning (Jonassen & Reeves, 1996). A major contribution of ICT in the field of education is - easy access to learning. Students can browse through e-books, have access to resource persons, experts, researchers and peers all over the world (Young, 2002).

Besides influencing the mode of delivery of education in the school setting, ICT is providing access to information of general nature to the populace for their enlightenment. Thus, it enhances the personal development and wellbeing of the people but reduces human deprivation. Wide range of information covering news, economy, business, sports, history, technology, science, health, entertainment, weather, etc. are obtained from the net for the general education of all. The populace gets information quickly and easily with the ICT infrastructures installation. Summarily, the populace becomes more informed and smarter with the installation of ICT infrastructure in day-to-day human activities. They are knowledgeable and can decide on the life they desire to live.

### **Problems associated with the use of ICT in Nigeria and remedy**

The lofty benefits of ICT notwithstanding, Nigeria lags in the use of ICT for human development. Access and applicability of ICT infrastructures in the country are bedeviled with some challenges. Lack of ICT skills, lack of basic education, obsolete equipment, high cost of the state-of-the-art equipment, epileptic electricity supply, and high cost of connectivity were some the problems exacerbating deployment of ICT infrastructures in the country (Yun & Opheim, 2010; Arugu & Chigozie, 2016). Bandwidth is imported and very expensive. Wi-Fi subscription for individual usage is expensive and sometimes beyond the reach of the poor. Databank and Servers, facilities for archiving data is expensive in the country, and it thus makes difficult storage and retrieval of electronic data of national interest.

### **Conclusion**

From the foregoing, it may be concluded that deployment of information communication technology infrastructures in governance mechanism have remarkable capability to lower human deprivation. Its provision in the forms of internet, personal computers, cloud computing, electronic mail and mobile phones as brought digital opportunity, which in turn made information and knowledge available



for all seamlessly. Furthermore, its application has brought improvement in the economy, commerce, living standard, healthcare delivery and life expectancy, and access to higher education system. Finally, it has improved the way of living through the use of artificial intelligence in human daily activities. It is recommended, therefore, that deployment of ICT infrastructures in the governance of the underdeveloped countries will reduce human deprivation and thus bridged the gap in human development between the low human development and very high human development countries. However, the challenges facing its deployment in Nigeria must be addressed in order to realize its potentials for human development in the country.

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