



## **ICT and Its Environmental Impact: The Role of the Graphic Artist**

**ALIYU Mohammed & Maxwell E. ROBERTS**

**School of Environmental Studies**

**Department of Arts and Industrial Design,**

**Federal Polytechnic, Nasarawa State**

**Nigeria**

**<sup>1</sup>[Bisalla2003@yahoo.com](mailto:Bisalla2003@yahoo.com); <sup>2</sup>[maxkekem@gmail.com](mailto:maxkekem@gmail.com)**

### **ABSTRACT**

Information and Communication Technology (ICT) has been popularized as the best form of technology through which information are spread, maintain and even retrieve in the world today; yet its impact on the environment are often less talked about. This paper examined the concept of information and communication technology (ICT) vis-à-vis environmental impact as it affects the growth and development of the society. The paper further attempts to evaluate the impact of ICT such as climate change, drought etc on the environment, thus include hazardous emission through incineration of ICT devices parts which are dangerous. However, it has shown that ICT in spite of its attendant impact on the environment is highly beneficial to globalization drive. Thus ICT environmental impact can be reduced through appropriate regulation of waste disposal/recycling and safety precautions. As well as proper education and public enlightenments through graphic art on ICT waste disposal as it affects the individuals and the environment.

**Keywords:** Information and Communication Technology, Environment, Graphic Artist.

### **INTRODUCTION**

Information and Communication Technology can have a high impact on the environment. Information and Communications Technology (ICT) has changed our society remarkably in the last few years. Although its effects on our everyday lives are obvious, the effects that this technology may have on the environment are much less clear and seldom talked about. To understand the effect of ICT on the environment, the characteristics of this industry have to be considered. One key feature is its great and continuously-increasing size. This means that many people all over the world use ICT products, and that in the future, even more people will use ICT devices. The consequence of this additional use will be an increasing impact on the environment; this will happen despite the fact that some ICT devices are more efficient, with a potentially smaller effect on the environment. It is becoming increasingly clear that we are unlikely to avoid major environmental challenges resulting from unsustainable practices to date. The most prominent example, climate change, is already noticeably triggering changes in agriculture, the incidence of forest fires, flood and drought patterns, and the movement of invasive Species and biodiversity, just to name a few.

Our best option in many cases will be to enhance our capacity to predict and track such changes, develop appropriate management and adaptation strategies, and plot a course toward a better environmental management. Information and communication technologies (ICTs) are transformative technologies in that they put intelligence at the edges of networks, thereby maximizing users' capacity to create and adapt. Examples of such transformation include using ICTs to improve practices in agriculture and forestry; monitor air and water pollution; improve disaster warning and relief; improve the efficiency of the energy, transportation, and goods and

services sectors; and harness social networking for transformative change. At the same time, the sustainability of these technologies must also be managed to avoid unintended consequences such as increased consumption and environmental damage from electronic waste.

The relationship among ICTs, innovation and the environment is often examined in terms of three distinct kinds of effects:

- First-order or direct effects, which arise from the design, production, distribution, maintenance and disposal of ICT goods and services by the ICT industry.
- Second-order or indirect effects, which arise from the application and use of ICTs throughout the economy and society, in government and public institutions, and in the research and academic communities.
- Third-order or systemic effects, which arise from changes in economic and social structures and behavior enabled by the availability, accessibility, application and use of ICT goods and services.

ICT-enabled systemic effects could dramatically impact economic and social parameters such as the attitudes, expectations and behavior of individuals as consumers, citizens and members of communities; the demand and supply of goods and services; organizational structures; production, distribution and service processes; and governance in the private and public sectors. From this perspective, the large-scale economic and social choices made by individuals, organizations and communities about how to use ICTs to change their structures and behaviors will play a potentially significant role in determining whether there is a successful global response to the challenge of achieving sustainable development.

Although ICTs have their own negative environmental impacts; they may also support the development of a green economy through their demonstrated connection to economic growth, and their enabling effects through application to increased efficiencies in energy use, production and distribution. Most importantly, their potential systemic effects could result in the transformation of the behavior, attitudes and values of individuals as citizens and consumers, as well as economic and social structures, and governance processes.

### **Concept of ICT**

ICT stand for information communication technology which refers to the technology that grants access to information. It includes any product that will store, restore, operate, or receive information in a digital form. ICT is similar to IT in that ICT focuses more on communication which includes internet, wireless network and other communication mediums. There are some examples of ICT tools, such as computing industry, telecommunications, and electronic display.

The computing industry includes Internet, computer hardware and software. Internet means a worldwide system of interconnected networks and computers. As we know that it is very useful for everyone today. For example, there are 5 out of 10 students using their iPad to search information while teacher is teaching. It is general and easy to have internet in the 21st century.

It is important to note that, software has various kinds of programs to operate computers and devices. It is often divided into two different types of software which is application and system. Application software is a program designed for users. It is also called and-user programs, which includes database programs, word processors, communications, games, graphics and spreadsheets. In contrast, system software consists of programs that interact with the computer at a very basic level. This includes assembler, debugger, compilers, file management tools, operating system and utilities for managing computer resources. Nonetheless, hardware is the physical aspect of computers and other devices. This could be monitor, CPU or memory chip. The item is something you can touch. The examples of hardware including the computer we touch and the mouse we use to click on this page.

Another example of tool is telecommunications which means communication by electronic as through cellular phones, radio, video and others. We always get the latest news and information

from all these media. For example, when we are driving somewhere in a hurry, we usually tune in our radio to listen to situation report on traffic.

Last but not least, electronic display that include calculator is one of the tools of ICT. Electronic means of operating produced, by the action of electrons. Calculator helps people to solve their mathematical problems a lot and also in the society especially for the accountants. For example, calculator in the computer helps to solve the accounting problems for every company.

As a result, modern information and communication technologies make a way for people to communicate with others across the world. For this reason, ICT often affects the education. Moreover, ICT in education can also be broadly categorized in the following way as a subject (computer studies), a tool to support traditional subjects (computer- based learning, presentation, research) and as an administrative tool (education management information systems). ICT is not only 0 great impacts on education but also provided some bad impact to the educators. Similarly, ICT also has some great impact on practitioners and schools.

Esuh (2005) notes that, the most advanced way of giving energy to human communication is information technology (info tech). Its speed spread and spontaneously has not only added debate and discussions to globalization, which has swept the world but has been a catalyst not only in the increasing need for brands to go multinational and global in their quest to advertise. Collins (1990) in Esuh (2005), states that the current and potential impact of ICTs on the economy is driven home by observation, as at 1983 ICT industries were generating the second highest revenue in United States. Compare to automobile industries, oil and steel. Nwabueze (2005) defines information communication technologies simply as communication gadgets, or facilities which improve, enhance the manner in which messages are shared, relayed, disseminated, preserved and recalled for meaningful communication purposes. In similar submission Akpan (2000) observes that, there are two types of communication technologies, the heartbeats, the modern and the computer, while the old communication technologies are other forms of technologies used before the advent of computer into communication systems such as teletext, telephone, photography, electronic news gathering, camera, microwave, video text, wireless intercom system etc.

According to Becta (2007) in Otuka e'tal (2013), Information Science, interdisciplinary academic field that deals with the generation, collection, organization, storage, retrieval and dissemination of recorded knowledge, Technology is the general term for the processes by which human beings fashion tools and machines to increase their control and understanding of the environment. The term is derived from the Greek words *tekhnē*, which refers to an art or craft, and *logia*, meaning an area of study; thus, technology means, literally, the study, or science of crafting. Information Communication Technology (ICT) is processing and maintenance of information, and the use of all forms of computer, communication, network and mobile technologies to mediate information. Communication technologies include all media employed in transmitting audio, video, data or multimedia such as cable, satellite, fiber optics, wireless ( radio, infra- red, Bluetooth, Wi-Fi). Network technologies include personal area network (CAN), intranets, extranets, LANs, WANs, MANs and the internet. Computer technologies include all removable media such as optical discs, disks, flash memories, video books, multimedia projectors, interactive electronic boards, and continuously emerging state-of- the art PCs. Mobile technologies comprises mobile phones, PDAs, palmtops, etc. These technologies have information as their material object. Information is not reserved for use in isolation, but, rather communicated among users (Idowu, 2001) in ( Otuka e'tal 2013).

Many historians of science argue not only that technology is an essential condition of advanced, industrial civilization but also that the rate of technological change has developed its own momentum in recent centuries. Innovations now seem to appear at a rate that increases geometrically, without, respect to geographical limits or political systems. These innovations tend to transform traditional cultural systems, frequently with unexpected social consequences. Thus technology can be conceived as both a creative and a destructive process.

According to Otuka, e'tal (2013) Information is a data processed for some purpose. Information can only be considered to be 'real' information if it meets certain criteria such as:

1. It must be communicated to the recipient
2. It must be in a language that is understood
3. It must be in a suitable form
4. It must be relevant for achieving some purpose.

A good way of thinking about ICT is to consider all the uses of digital technology that already exist to help individuals, businesses and educational organizations use information. Information and Communication Technology (ICT) covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. For example, personal computers, digital television, email, robots. So Information and Information Communication Technology (ICT) is concern with the storage, retrieval, manipulation, transmission or receipt of digital data. Importantly, it is also concerned with the way these different uses can work with each other (Richard, 2011 in Otuka e'tal 2013).

Information technology (IT) is often seen as a very daunting subject because it involves many different specialist areas. However, the basic principle of information Technology (IT) is to simply help us to improve the way we deal with information in all areas of our lives. Information Technology (IT) is used in business, industry, government, education, health care and in everyday home/social life. Computers enable us to process information and perform specific tasks much more quickly that can often do ourselves. Information Technology (IT) systems are usually very flexible and can be made to perform a wide variety of different tasks. Information Technology (IT) networks allow us to distribute and share information very quickly (a prime example is the internet).

#### **Technology Impacts on the Environment**

Assessing the impact of the ICT industry on the environment is surely a complex issue, with many facts having to be taken into account. Information and communication technologies (ICTs) have been contributing to environmental problems: computers, electronic devices and ICT infrastructure consume significant amounts of electricity, placing a heavy burden on our electric grids and contributing to greenhouse gas emissions. In 2007, the total footprint of the ICT sector – including personal computers (PCs) and peripherals, telecoms networks and devices and data centers – was 830 Mt CO<sub>2</sub> emission, about 2% of the estimated total emissions from human activity released that year (a figure equivalent to aviation). ICT hardware poses severe environmental problems both during its production and its disposal. Each stage of a computer's life, from its production, throughout its use, and into its disposal, presents environmental problems. Manufacturing computers and their various electronic and non-electronic components consume electricity, raw materials, chemicals, and water, and generate hazardous waste. All these directly or indirectly increase carbon dioxide emissions and impact the environment and the trend is to increase in the BAU (Business As Usual) scenario, Williams (2005).

#### **Possible Sources of Exposure**

Exposure to the toxic compounds mentioned above can take place after the disposal of the ICT devices. There can be exposure, for instance, if these elements/chemicals leach from a landfill into the environment; clearly this process can cause damage and have noticeable impacts on the environment, both short and long term.

The incineration of parts of the ICT devices may also cause exposure to hazardous substances. The incineration of waste which contains these kinds of chemicals is forbidden by law. It can happen, however, that these parts may be accidentally incinerated together with other domestic waste. This can be particularly dangerous if FBRs are present, as during the combustion they can form brominated dioxins – very toxic molecules.

Another possible source of exposure is the re-use and/or recycling of these devices, or of part of the devices. Strict regulations are in place to recycle materials which may contain toxic elements; these, however, are not always applied in developing countries. In places like China, India or in

some African countries, there is an “informal” market, to recover and reuse the valuable compounds of these ICT devices. Metals such as gold or copper, for instance, are present in the majority of the devices; they are recovered using processes without any safety precautions; these processes can generate hazardous compounds, posing a threat both to the environment and to the workers involved in them.

#### **Graphic art and ICT**

However, Art is a very important means of communication. With particular regard to the purpose of graphic communication which combines pictures, words and embellishment in the design of books, magazines, software, web-pages etc., graphical representation of data, findings, and creation of awareness on salient environmental issues are very important. One of such areas where graphic art is very relevant is in the area of educating, informing, and creating awareness on some of the hazards of ICT in the environment as it directly or indirectly affects the lives of the people. It is therefore, the desired responsibility of the artists to create means of enlightening the people at the grassroots on how not to dispose ICT wastes, such as old computers, batteries, outdated hardware, phones, and so on. The awareness should also include the graphical illustrations of health implications of such disposals and uses. These include, long exposure to the electronic radiation from computer monitors, the effect of the screen glare on the eyes, and the impact of the hazardous emissions from burning of the computer hardware in the process of disposal.

#### **CONCLUSION**

In the light of the above, the concept of information and communication technology (ICT) have been examined and found that its impact on the environment are both beneficial and problematic. One can agree with the fact that, ICT as a component of globalization make a way for people to communicate with others across the world without barriers, but has in it, an attendant negative impact on the environment among which include hazardous emissions and other toxic wastes.

On this note, ICT can be hazardous to the environment especially when it concerns electronic waste disposal, recycling laws and safety precautions which people tend to violate at will. Thus the impact of ICT on the environment can be regulated through appropriate legislation and strict adherence to waste disposal, recycling and safety precaution law, as well as proper education and Public enlightenments through graphic art on proper ICT waste disposal as it affects the individuals and the environ.

#### **REFERENCES**

- Akpan, C.S. (2004), “The Impact of the New Communication Technology on the broadcast Industry in International Journal of Communication, No 1, March, pp 70-78.
- BCC Research: 2010- Information- Technology- Research, Review; Retrieved July 3rd, 2015, from <http://www.bccresearch.com/report/2010-informaton-technology-review-ift083a.html>.
- Collins,E. and Devanna, M.A. (1990), *The portable MBA*, Ibadan Spectrum Books Ltd.
- Dimevski, D., Kokol, P. (2004). *ICT and Lifelong Learning*, EURODL. European Journal of open Distance and E- Learning Slovenia: University of Maribor, PP. 1-6
- Eshu, P. (2005), *ICTs Globalist and Multinational Advertising: Imperatives for the Advertising Industry in Nigeria*
- Williams, E. Environmental effects of information and communications technologies; Retrieved July 3rd, 2015, from <http://www.Nature/nature/journal/v479/n7373/full/nature1068Com>.
- Nwabueze, C.D. (2000), “marketing Foundations Advertising and Public Relations ACCE Owerri Conference paper, 2005
- Eze, C. (2007), *Information Communication Technology, Globalization and Graphic Arts Communication, An analysis of Nigeria in The Studio, A Journal of Contemporary art*

- Practice and theory Published by the Department of Fine Arts, Zaria Ahmadu Bello University.
- Maclean, D eta'l (2007) Internet Governance and Sustainable Development: Towards a Common Agenda. Retrieved July 06, 2015, from <https://www.iisd.org/publications/pub>.
- Otuka, E. eta'l (2013). TETFUND research report on the Awareness and the use of E- Learning among science teachers in secondary schools in Nasarawa state, Keffi, Nasarawa state University.