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The Issues and Challenges of the Digital Age and Societal Development

IGBUNU, Richard O.

Department of Computer Science
Delta State College of Education, Mosogar; Nigeria
Email: igbunu4richie@gmail.com
Mobile: 08037843686

ABSTRACT
Looking back into the years, it is realistic to accept that the global society has come a long way technologically. The computer technology which evolved with sundry names such as; the Digital age revolution, Internet revolution, Binary revolution, Multimedia revolution, and so on, is causing a revolution that is making profound changes in society. This paper's focus is on the Digital age revolution impact on societal development and its accompanying challenges. The digital revolution via computers and associated devices are revolutionizing and making its impact felt in every facet of human endeavors of .our modern lives and made visible in business procedures, medical care, security operations, military warfare, governance, manufacturing, communication, sports and many other areas. The Digital age evolved as a result of the birth of digital devices or computer aided systems. The upsurge in technological advancement has created the digital age revolution which in turn has resulted in developing computer literacy amongst its end-users for societal development. The digital age especially in a country like Nigeria, as greatly influenced all human activities by its applications. The impact is making Nigerians get adapted to electronic systems for continuous global relevance and has placed our modern life as a society into the bandwagon vehicle on the 24/7/365 information highway. The digital age revolution has popped up avenues for societal development through man-power development by the knowledge of and skills acquired from desktop publishing; Internet training for online examinations like Joint Admissions and Matriculation Board Examinations (JAMB) Computer Based Tests, National Open University of Nigeria (NOUN) admission processes, foreign educational programmes' admissions and examinations processes, e-learning; Software skills acquisition for programming in computer languages, website design, recharged cards printing.; Knowledge and skills in system networking, Personal Computers' (PCs) repairs and maintenance, trouble shooting; the process of and skills to operating social media such as email, Whatsapp, Facebook, konga.com, jiji.com, etc., for economic contacts and empowerments. The digital age revolution has frog-jumped the applications of computer technology in solving human challenges. The revolution is not without its challenges, and these are well discussed in this paper. The paper also captured some effects of the digital age on the different sectors of the society vis-à-vis its impact on societal development. The paper offered very useful recommendations on how best to maximize the benefits of digitalization globally.
Keywords: Digital Age, Societal development, Digitization, Multimedia revolution, Computer literacy, Manpower development.

INTRODUCTION

Digital Age challenges and societal development, is about the computer technology modern applications and how it is affecting us. Today, the word "digital" is used almost interchangeably with the "computer". The computer and its accompanying technologies, has brought to bear on our society geometrical developments with its consequences.

The present age we find ourselves can be aptly called the digital age, as all its facets are coming under the influence of digital computers and the Internet, impacting positively and negatively on our social development, depending on the sides from which one views it.

Digital means Computer-based and describes any system based on discontinuous data/events. It refers to communications signals/information, represented in a two-state (binary) system, using electronic/electromagnetic signals, making all data processed by a computer to be coded digitally, as a series of zeros and ones. The digital age came as a result of the birth of digital devices/technological systems. The present developmental stage of computers and associated devices are revolutionizing the way man lives presently- from business procedures, medical care, military warfare, communication, home management, and numerous others. The digital age is gradually creating a virtual world, with every activity of man influenced by it. The digital age is making us get adapted to electronic systems for continuous societal and global relevance by creating a modern life system template that works on the 24/7/365 information highway. Digitalization has brought about remarkable changes with attendant challenges.

Most if not all organizations in Nigeria, presently rely on the Internet and digital devices to source for information and carry out businesses in record time. In times past, this was unthought-of. The digital age has also raised a lot of questions about health concerns on the continuous usage of the computer, the privacy and security of persons, creation of unemployment, etc.

The digital age carries with it, activities of digital devices risks, and unless the usage is properly channeled, the outcomes could affect our leisure time, and equally affect high productivity, which is its basic objective.

The digital Age and its technologies – the computer and the Internet, according to (Rheingold, 2002), have created a situation of smart mobile devices producing smart mobs; groups of people who do things together without the knowledge of each other, posing privacy and security challenges world-wide.

Communication is getting to every nook and cranny of the globe with the aid of the digitalized tools–the computer and Internet technologies, resulting in "cyberspace plumbing". The hallmark of great civilizations has been their systems of communications. In the beginning, communications were based on transportation. Then transportation yielded to the electronic exchange of information in 1844, when the telegraph ended the short existence of the Pony Express. In 1876, the telephone evolved. In 1889, electromagnetic radio waves were transmitted throughout England. Television came into being in 1925, creating the global village phenomenon. But lately, technology has become portable, giving us more power for communication. Two decades ago, cell phones, pagers, and portable computers with communications links barely existed, now they are commonplace. And as computer and communications technology go digital, the computer, communication, electronics, entertainment, etc, are undergoing digital revolution. It is a fact that the electronic World digital effects is causing increasing impact on all human activities. Modern appliances such as smart devices like handsets, television, compact disc, digital photo copiers, personal digital appliances (PDAs), etc; rely on microprocessors designed for our developmental needs.

The Motive: To enlighten society on developments caused by the digital age and its challenges to modern human existence.

The Objective: To enlighten people about the impact of the digital age, its challenges and how it has affected and still affecting society positively and negatively.

Issues in the Digital Age

Human errors; result from human perceptions which in the modern information environment could result into the breakdown of electronic systems.

Procedural errors; the era we are in can become catastrophic, as a result of slight errors, because of non-adherence to procedures. (Paulos, 1999) observed that Mars climate orbiter, fed data in pounds instead of Newton unit force (1 Newton gives 22% of a pound), forced it to fly too close to the surface of Mars and broke apart. Equally, a failed software upgrade halted trading on the New York Stock Exchange for 1½ hours, as reported by (Alien, 2001).

Software errors; software bug in a program can cause improper working of systems causing incredible frustration and security risks.

Electromechanical problems; modern systems comprises multiple parts which interrelate resulting into inevitable accident(s) as was the case with the three mile island nuclear power plant in 1979, reported by (Lee, 1994). The problem has also caused a rise in car crashes, caused by drivers talking on their wireless phones, opined (Alonso-Zaldivar, 2002).(Vinlio, 2002) suggested that in the digital age, "normal accidents" are to be expected and will be more global in impact in this age of digitization.

Health Related Problems in the Digital Age; a notable one is Isolation, which is the possibility of staying without physical contacts with others due to addictiveness to digital systems. This brings about depression, a serious health concern.

Economic Issues; two serious economic issues that evolved with the digital age are that, information technology is killing jobs and widening the gap between the rich and the poor. Automated Teller Machines (ATMs) have replaced bank tellers, and Internet travels do lure customers away from small travel agencies. Hundreds of companies are replacing service representatives with voiced software. In new so-called lights out factories, machines make things in place of humans, causing job losses.

Though, the contribution of technological advances to economic progress is steady, but the contribution to social progress is not purely positive. In developed countries, intelligent machines are replacing humans in countless tasks, "forcing millions of blue-collar and white-collar workers into temporary, contingent, and part time employment and worse, unemployment" (Rifkin,1995).

The Digital Age Effects on Sectors of the Society

Network Competition, Policy and Management: As multiple platforms for voice and data services evolve, competition remains an issue. With migration to Internet Protocol-based networks, one network can handle many types of converged services and so reduce the number of potential competitors.

Technology continues to deliver new generations of devices, which raise novel policy and management questions. The widespread use of a variety of small devices with wireless communication capacity (intelligent sensors) will doubtlessly open up the possibility of novel communication systems; say through ad-hoc networks such as the Radio Biafran employed outside the shores of Nigeria for the succession struggle in the Eastern part of the country.

The Digital Age, Development and Growth: It is a fact that information and communication technology (ICT) have positive impacts on the economic, social, and political developments of a country, region, or community. Today governments around the world are attempting to realize the benefits of the digital age via ICT applications and are making efforts to ensuring widespread access to these networks and applications, to aid in developing all sectors of their nations' economies for societal growth. The private sector is not left out; it has taken the lead in providing Wi-Fi hotspots for her staff and clients in public places such as in airports, universities, international conferences centres, fast-food spots, schools, libraries, rural communities, etc; promoting access to information and communication technology (ICT).

Connectivity nonetheless should not be the prime issue, as there is also the need for training and content development for the users of the digital technologies so as to equip them fully to enhancing their living standards.

The Digital Age and the Media: Digital technology and the Internet are transforming the platforms for delivering news, entertainment, sports and other information in significant ways. Today, individual users

are increasingly becoming creators: they can share their perspectives with one another via blogs; inexpensively remix traditional media into individual visions; and collaborate with one another via wikis. This wave of creative works is distributed broadly over new peer-to-peer and many-to-many distribution systems.

In addition, users have gained more control over what they watch and when they watch it through "on demand" technologies such as YouTube, MySpace, and other Internet-based distribution platforms.

Privacy & Security in the Digital Age: Security and privacy issues constitute a complex web of inter-related issue in this digital age. Concerns with cyber-threats have been increasing over the years, with the truism that privacy and trust are contested concepts recognized for long. As the Internet and telecommunications become ever more deeply entwined with economics, politics and employment, security and identity issues have also become more fluid. Identification in a digital world is made more problematic by issues of liability, and human conceptions of virtual spaces. As identity and security becomes more complex, privacy will be sacrificed on the altar of technological advancement.

Technology continues to deliver new generations of devices, which raise novel policy and management questions, regulating access to private records in public places. The spread of Radio Frequency Identification (RFID) as well as location services in wireless telephony will likely mean that someone's location at any point in time can be located with great precision. On line, increases in processing power and policy-based routing enable service providers to develop new systems, in directions that will allow them to control what customers do to an unprecedented degree.

Additional concerns are raised by the borderless nature of cyber-space, the international nature of these threats and the ease with which the operations of these cyber-criminals can move from one country to another.

The Digital library: A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system and a product of the digital age. It is a potentially virtual organization that comprehensively collects, manages and preserves for the long depth of time, the rich digital content, and offers to its targeted user communities specialized functionality on that content, of defined quality and according to comprehensive codified policies.

The Digital Library has a Digital Library Manifesto which consists of three types of relevant 'systems'- Digital Library, Digital Library System, and Digital Library Management System.

Many academic libraries are actively involved in building institutional repositories of the institution's books, papers, theses, and other works which can be digitized or were 'born digital'. Many of these repositories are made available to the general public with few restrictions, in accordance with the goals of open access, in contrast to the publication of research in commercial journals, where the publishers often limit access rights. The future is certain for digital libraries. Large scale digitization projects are underway at Google, the Million Book Project, and Internet Archive. With continued improvements in book handling and presentation technologies such as optical character recognition and e-books, and the development of alternative depositories and business models, digital libraries are rapidly growing in popularity as demonstrated by Google, Yahoo!, and MSN's efforts.

It is believed that the world's total yearly production of print, film, optical, and magnetic content would require roughly 1.5 billion gigabytes of storage. Therefore, soon it will be technologically possible for an average person to access virtually all recorded information as a result of the digitalization of the library.

While traditional libraries are limited by storage space, digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain it, and cost less to maintaining a digital library than a traditional library.

The traditional library spends large sums of finance paying for staff, book maintenance, rent, and additional books. But the digital libraries may reduce or, in some instances, do away with these fees making it more cost effective and equally freeing some finance for the development of another sector of society.

Digital Education: The Internet's communication capabilities in this digital age, made it a potentially useful tool for sourcing educational resources for human capacity development. The computer's ability to simulate physical systems makes it potentially useful in teaching the sciences, social sciences and the arts. More often, however, debate of digital education reform centers around more general applications of computers to education, such as electronic test-taking and online classes.

The present drive is in harnessing the richness of the Internet for online education/e-education to provide educational resources to majority of the global population. The richness of the Internet is assisting students to be intrinsically motivated to educate themselves, and to aid them in self-actualization propelled towards societal development. With the digital age, any teacher may upload course(s) online and receive immediate responses to the requests. It also aids students to choose relevant courses of the highest quality online, and helping teachers provide links in their digital courses to webcast videos of their lectures. Communication devices from digital libraries, and availability of more portable technological devices, have opened up a world of educational resources to both the educator and the learners.

Health and Medicine: The effect of the digital age is very pronounced in the health care sector, as rural health care providers can now use tele-radiology to exchange digital images like x-rays via telephone-linked networks with expert physicians in urban areas. Presently, digital cameras and sound are employed in moving patients to doctors online, according to (Schatz, 2003).Computer technology is changing the tools of medicine to help control medical costs. The digital age has created a pharmacy on a chip, called micropill that can be implanted in humans to deliver tiny amounts of medicine on a controlled-release basis. The digital era has also made it possible for a paralyzed/stroke stricken patient to communicate as a result of implanted digital device. A digital device called the sacral anterior root stimulator when implanted over the sacral anterior root ganglia of the spinal cord of paralyzed male patients, delivered intermittent stimulation which improved bladder emptying, assists in defecation and sustained erection. Recent digital systems utilize more advanced probes, such as those used in deep brain stimulation to alleviate the symptoms of Parkinson's disease. The innovations in this sector which are products of computer technology are numerous with more on the pipe line.

Challenges of the Digital Age

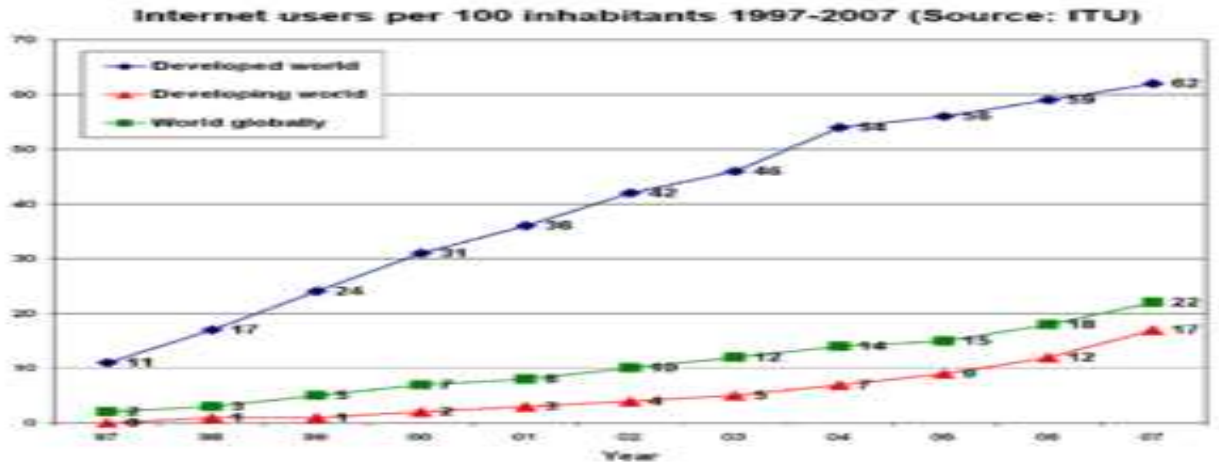
The Digital Dark Age: is a term used to describe a future situation where it will be difficult or impossible to read historical or past documents, because of their storage in obsolete digital format. The name derives from the dark ages that relate to the future relative lack of written records. The concern that led to the use of the term arose from the fact that documents stored on physical media required special hardware to be read, but that this hardware will not be available in a few decades from the time the document was created. For example, it is already the case that disk drives capable of reading 5¼-inch floppy disks are no more readily available. The problem of the digital age is not limited to text documents, but applies equally to photos, video, audio and other kinds of electronic documents. It also applies to the problems which arise due to obsolete file formats, that is, the lack of the necessary software which causes problems when retrieving stored documents. This is especially problematic when proprietary formats are used, in which case it might be impossible to write appropriate software to read such files.

A famous example is with the National Astronomical Society of America (NASA), whose early space records suffered from a Dark Age issue; for over a decade, magnetic tapes from the 1976 Viking Mars were unprocessed. When these records were later analyzed, the data was found unreadable as it was in an unknown format with the original programmers either died or had left NASA. However, the images took much time and cost before they were eventually extracted. Another example is the BBC Domesday project in which a survey of the nation was compiled 900 years after the Domesday Book was published. While the information in the Doomsday Book is still accessible today, there were great fears that the discs of the Domesday project would become unreadable as computers capable of reading the format had

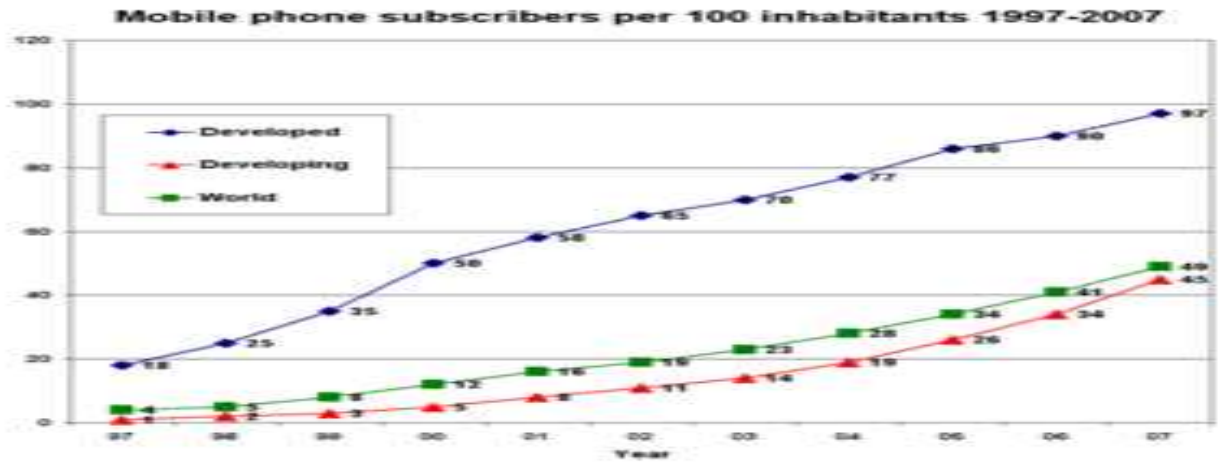
become rare and drives capable of accessing the discs even rarer. However the system was emulated in 2002 and the information on the discs can currently be read on modern computers.

Encrypted data may also prove to be an issue, as the process needed to decode the data is intentionally made as obscure as possible. Historically encrypted data is quite rare but even the very simple means available throughout history have provided many examples of documents that can only be read with great effort. For example, it took the capacity of a distributed computing project to break the mechanically generated code of a single brief World War II submarine tactical message. With the ever changing technology, brought about by the digital age, the arrival of the digital Dark Age is a sure challenge to mankind. However, renowned computer firms such as Microsoft, Internet Archive, in addition to others, are working hard to eliminating the digital age challenge and help to unlock millions of unreadable stored computer files. As it stands, the Internet Archive is making the prevention of the digital Dark Age a basic goal.

The Digital divide



Graph of Internet users per 100 inhabitants between 1997 and 2007 by International Telecommunication Union



Mobile phone subscribers per 100 inhabitants' growth in developed and developing world between 1997 and 2007

The digital divide, another main challenge of the digital age, refers to the gap between individuals, households, businesses, states and countries at different socio-economic levels with regard to both their opportunities to access information and communications technologies (ICTs) and their use of the Internet for a wide variety of activities. The digital divide speaks about the imbalance in the physical access to technology and the resources and skills needed to effectively participate in the present digital age as a digital citizen. Knowledge divide globally, reflects the access of various social groupings to information, knowledge, and computer technology. These social groupings are categorized by gender, income, race, and location. The term global digital divide refers to differences in access between people, persons, communities and countries in regards to the Internet and its means of information flow.

Typical measurements of inequality distribution used to describe the digital divide are the Lorenz curve and Gini coefficient. In the Lorenz curve, perfect equality of Internet usage across nations is represented by a 45-degree diagonal line, which has a Gini coefficient of zero. Perfect inequality gives a Gini coefficient of one. However, the question of whether or not the digital divide is growing or closing is difficult to answer.

The Figures 1 and 2 above show a trend of growing equality from 1997 to 2007 with the Gini coefficient decreasing.

The progress represented is predominantly of the middle-income groups when compared to the highest income groups. The lowest income groups continue to decrease their level of equality in comparison to the high income groups. Therefore, there is still a long way to go before the digital divide could be eliminated.

As at the year 2000, the use of broadband Internet in the United States of America has risen drastically, reducing the digital divide amongst Americans. A survey in the United States, found out that 41.5 percent of households had Internet connection with 4.4 percent of households connected with a broadband source. By October 2010, 71.1 percent of American households were already connected to the Internet with 68.2 percent connected with a broadband connection. The above is in contrast with technologically backward nations like Nigeria and others in Africa.

Some social groupings created by the digital divide

a) Education; is one area where the digital divide is prominent. In order to properly tackle the digital divide among schools, current formulations should focus more on how (and whether) students use computers, rather than whether there are computers or Internet connections. There exists a program of the Universal Service Fund in the United States put in place, to directly address the technological gap between rich and poor schools by allocating money from telecom taxes to poor schools without technology resources, this should be emulated by a country like Nigeria for advancement in her educational sector to meet global trend. The problem of the digital divide in institutions of learning is accessed to have broadened to include the deficiency of technology related skills and training in addition to basic access to computers and the Internet among developed and developing nations. Broadening students' technologically related skills is a key part of eliminating the digital divide between the nations of the world.

Access to technology is often divided within schools, organizations, communities and nations according to their socio-economic status. The developed nations are on the top the digital age pyramid, with the poor nations at the bottom, resulting in a digital divide. Developing countries lack access to extensive and quality educational opportunities, due to poor ICT infrastructures. So, there is the great need for technological education as it has the potential to greatly contribute to the prosperity of developing nations. It is possible for poverty-stricken regions to enhance communication with other countries by investing in ICT infrastructures, thereby offering their citizenry economic, social, and political opportunities to contribute in bridging the digital divide. However, for nations to successfully combat the digital divide, they must step above just introducing and implementing technology in these poverty-stricken areas. They must ensure the provision of technological resources coupled with adequate education on how to use technology in a more resourceful way so as improve their living standards, whether as related to health care, economic support, education delivery or other areas of needs.

While the digital divide is narrowing in developing countries due to the increase in portable smart systems and Internet access, there is still a great deal of progress to be made. According to Reuters, mobile network communication in developing countries have greatly contributed to their economic successes, as small businesses expand their scope of communication and increase the number of transactions made with an increasing number of Internet users. But the basic problem of illiteracy remains a basic setback. Because, the digital divide will only decrease when more people learn how to use the digital technology.

A nation like Nigeria is making efforts to bridge the digital divide through programs such as Computers for All Nigerians Initiative (CANi) which provides laptops for citizens in academic institutions for ready access to the Internet.

b) Gender barrier; for years, women have been backward in the use of technology. It has been observed that the digital divide for women is much greater than for men among nations globally. Men have always been major users and creators of technology worldwide, because of their economic and social advantages. Hence, most ICT infrastructure primarily appeals to men. It is also believed that gender stereotypes play a role in how men and women react to technology. The gender stereotype that, men are better at using technology than women, act as a catalyst in expanding the digital divide in a gender sense.

But there is evidence that the digital divide with reference to gender may be changing in favour of women especially in developed nations like the United State, where research in Commerce showed that, between 2001 and 2004; women used the Internet, by one percent more than men. Also, a 2009 Census data suggested that the gender divide in the US has become nearly nonexistent; as 73% of female citizens have access to the Internet from their home, compared to 74% of males. Additionally, 68.8% of females three years and above have access to the Internet from some locations (either within their household or outside), compared to 67.9% of males. Similarly, in China, between 1997 and 2002 the percentage of Internet users who were women rose from 12% to 39%, and the rise is continuous across nations, especially the developed nations were digital technology is readily available and affordable.

c) Global Digital Divide; is engineered by the amount of technological resources available to different nations of the world. The global digital divide describes the information technology disparities between different regions of the world in relation to generalised rates of social, economic and technological developments.

It is believed that, as the Internet becomes progressively more sophisticated, the digital divide will continue to grow, leaving behind regions and nations whose computer technology usage and Internet access is least affordable and available. ***Countries with a wide availability of Internet access can advance the economics of their countries on local and global scales*.** In developed societies, commerce and social interactions are almost entirely Internet dependent to a lesser or greater extent. Countries where the Internet and digital technologies are less/inaccessible, produce uneducated people, poor economies and undeveloped societies. And so make them less competitive in the global economy.

d) Governance; one problem associated with the digital divide as applied to liberal democracy is the inability of citizens of most nations, especially the developing ones, to participate in the new public space called cyberspace. There is a clear cut between developed and developing nations in regard to the digital divide as it concerns governance. The developed nations like the USA, Japan, United Kingdom, Germany, etc, have high degree of technological literacy, as opposed to most developing nations like Nigeria, Liberia, Togo, Sudan, Kenya, etc. The situation has continued to encourage global digital divide.

The developed nations employ ICT in governance, encouraging participatory democracies. The governed and the governors relate through electronic media such as the email, websites, twitter, Whatsapp, Instagram and Facebook. Government policies and plans including budgetary and fiscal issues are made public via these electronic media for transparency in governance, reducing suspicion and bringing corruption to a tolerable level. But in majority of the developing nations such as Nigeria, policies and goals of governments are carried out manually and so shrouded in secrecy, encouraging corrupt practices in governance. The fairness of elections in the developed nations is due to the fact that the process is electronically biased. Therefore, majority of eligible voters, even those in foreign lands participate in electing their choice of leadership devoid of constraints such as distance and manipulation of votes and

mandates. But the countries that are backward in information and communication technologies are bedeviled by electoral frauds, resulting in bad governance and poor economic development.

CONCLUSION

Revolutions such as the industrial revolution, made great contributions to the quality of life and brought about fundamental socio-economic developments, and cultural changes throughout the world during that era. But the birth of the digital age has made far more reaching impact globally on societal development than any previous revolution, impacting enormous and unbelievable changes on societies.

The most significant changes brought by the digital age, are directly or indirectly economical and technological in nature. Compared to the pre-digital age, one can conclusively opine that the digital age has brought with it far reaching developmental changes, dictating our survival in a global world, notwithstanding its attendant challenges. The digital age has created greater social and local mobility of resources among global citizenry.

RECOMMENDATIONS

1. The digital age demands less use of human efforts for majority of people due to the user-friendly construct of electronic devices. This should be discouraged to save jobs to industrial stability worldwide.
2. The use of the digital age devices in all sectors of global economy should be with moderation, to reduce growing unemployment, as electronic machines are practically taking over jobs from humans.
3. Sensitive and life threatening digital devices should be controlled globally, to keep them from the custody of criminals and terrorists, who could deploy them as tools for crimes and violence.
4. Security agencies should exploit the potency of digital devices in tackling cross border crimes like smugglings, money laundering, cyber-crimes, etc.
5. Digital devices made to improve agricultural production, should be subsidized and made available by such nations and industries for developing nations to improve on global food outputs towards checkmating global food crisis.
6. Employers of labour globally should ensure the training and re-training of staff to get them acquitted with the ever evolving working patterns of digital devices, so as to accrue maximum productivity for societal development.

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