Prospects and Challenges of the Fourth Industrial Revolution for Academic Libraries in the 21st Century Nigeria: A Literature Review

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Abstract:
The purpose of this paper is to provide challenges on the changing roles of the fourth industrial revolution in information delivery in academic libraries in the 21st century in Nigeria. The paper is a reflective piece examining digital technology revolution and advancement in the context of academic libraries. The paper argued that despite that the fourth industrial revolution have brought easy access of using digital technology services to connect cyber, virtual and physical space in advancing information service delivery in libraries, challenges of the fourth industrial revolution in academic libraries in developing countries have led to a wide gap in the way information is delivered with digital technologies. Various studies indicated that digital technologies such as robotic technology, artificial intelligence, cloud computing, big data, social media, smart phones, digital cameras, sensors and Internet of Things are contributing significantly in global information provision and dissemination. The paper concluded that the fourth industrial revolution in academic libraries is meant to bridge the prevailing information provision gaps in the teaching, learning and research needs of the users. However, challenges such as poor training, poor usage of digital technologies and lack of awareness on the effective use of digital technologies hindered easy flow of digital technology revolutions to close the gaps between developed and developing countries for development and advancement in the provision of effective library services.

Keywords: Fourth Industrial Revolution, Digital Technology, Academic Libraries, Librarians, Challenges.

1.1 Introduction

The fourth industrial revolution is connecting cyber, virtual and physical space with advancement in digital technology which has made communication, collaboration, information flow and work easier. For example, self-driving cars, online shopping and drone delivery services are digital technology systems that continue to solve some of the world's biggest problem faster with fewer errors and better result (Ellen Frederic, 2016; Cronje, 2018). The fourth industrial revolution also reflect and guide our way of life and thinking towards digital

technology development for advancement in collection and processing of huge amount of information at an alarming rate (Penprase, 2018).

Digital technologies such as robotic technology, artificial intelligence, big data, social media, smart phones, digital cameras, sensors Internet of Things and cloud computing are contributing significantly in global information provision and dissemination (Hussain, 2019). Digital technology and digital media have changed the meaning of information service delivery in the 21st century libraries. This is because the advent of digital technology has transformed the way library services are delivered for communication, information generation, access and dissemination (Davies, 2016; Gulcin, 2017). However, literature reviewed has indicated that there are disparities of digital technology revolution between the developed and the developing countries (United Nations, 2017). While developed countries like Britain, the United States of America, France and Germany have harnessed digital technology services to foster development and advancement in all aspects of life; be it social, economic, education and technology, developing countries like Morocco, Tunisia and Malawi still find it difficult to progress into a technology-driven environment, global economy and knowledge-based society (UNESCO, 2017).

In spite of these challenges, digital technology has brought sustainable development that embraces advancement and digital revolution in Africa. Today, many African countries such as South Africa, Kenya, Egypt, Nigeria, Botswana and Ethiopia now utilize knowledge of digital technology revolution to improve Health, Education, Aviation, Economy, Security, Industrialization, Banking and Finance as well as Agriculture (African Digitalization Maturity Report, 2017). Also, the emergence of artificial intelligence, robotic technology,

cloud computing, mobile and media technologies has witnessed development and transformation in digital technology revolution (International Telecommunication Union, 2017). Adaja and Ayodele (2013) opine that advances in computer technology, telecommunication, mobile technology services and social media platforms have facilitated the creation of interaction among many African countries not only to seek for information, but also to exchange ideas and knowledge via email, teleconferencing, chatting and other avenues for digital technology development.

2.1 Literature Review
Fourth Industrial Revolution and the Changing Role of Libraries

Libraries are essential to learning, research, generation and preservation of knowledge as well as dissemination of information. The fourth industrial revolution is considered as a phenomenon offer by digital technology revolutions that foster libraries to assume new thinking towards information service delivery (The University of South Australia, 2016). Libraries now use Internet of Things (IoT), artificial intelligence, smart phones, social media, cloud computing, robots in combination with RFID technology and data of bibliographic record to give access to the patrons and general users quality library services through cutting-edge technology (Bernard, 2017). Such kind of newest technology is considered to be the part of the fourth industrial revolutions.

However, evidence from literature indicates that many libraries in developing countries are still lagging behind in acquiring knowledge of digital technology (Ukwoma & Iwundu, 2016). For example, Ansari's (2013) study indicates that librarians in Pakistan find it difficult to keep pace with new technologies in providing library services. Similarly, Davies (2016) states that libraries in developing countries still find it difficult to

download and search online resources, use web technologies, access online information, locate and navigate uniform resource locators (URLs) and perform basic Internet search. A study by the African Library and Information Association and Institution (2016) indicates that libraries in some parts of African countries still find it difficult to perform basic tasks of online searching, web technology, understand and use computer hardware and software and perform basic Internet search activities due to poor knowledge of digital technology.

Despite these problems, digital technologies have opened up opportunities for libraries to engaging, inspiring, enabling and connecting in information sharing, media literacy, digital learning ability, communication, digital content creation, digital identification and information and communication technology (ICT) services (Joint Information System Committee, 2016). IFLA (2017) maintains that libraries require digital technology services in operating computers, ICTs and other digital facilities for development to meet up with the fourth industrial revolution expectations in providing effective and efficient information services. The American Library Association (2015) also maintains that the ability to access and successfully use digital information is central to library development and advancement with fourth industrial revolution.

Digital Technology Revolution in Academic Libraries in the 21st century

The 21st century academic libraries are characterized by digital and virtual environments where wireless and digital technology services have grown rapidly in the past decade and users search for information via digital devices to retrieve information across the world (Davies, 2016; Howe, 2016; International Telecommunication Union,

2017). The advent of ICTs and the evolution of World Wide Web (WWW), smartphones, tablets, robots, e-books, game machines and even light bulbs have enabled academic libraries to advance in research, teaching, learning and information service delivery (Howe, 2016).

Digital technologies are those information resources that can only be accessed by the use of computers and other ICT devices. These materials may require the use of a peripheral device directly connected to a computer or computer network (Hallam, 2016). There are different types of digital resources such as, Digital video Disc (DVD), the Internet, Online Public Access Catalogues (OPAC), electronic books, electronic journals and electronic index (Hallam, 2016).

Globally, the intervention of digital technology revolution has given rise to new modes of organizing, processing and accessing information resources in the libraries. With the emergence of Web 2.0 and web 3.0 technologies, cloud computing, Internet of Things, robotic technology, social media platforms and electronic resources, libraries now assume new thinking and new role of meeting the need of ever growing and dynamic society (Hussain, 2019).Digital technology revolutions are products of information and communication technology to library services. Many academic libraries around the world have been increasing their digital platform to ensure efficient and effective information resources provision in the technology driven environment. Digital technology revolutions have exploded in popularity and use. They enable innovation in teaching, and increase timeliness in research as well as increase discovery and creation of new fields of inquiry (Ahmad & Panda, 2013).

Digital technology revolution allow access to networked information resources such as bibliographic databases, remote library catalogues, bulletin boards, discussion

groups, downloading remote files, acquiring software, ordering and subscription of online information materials and communication with other libraries (Ayoku and Okafor, 2015). Today, digital resources have enhanced access to digital collection of information resources (Anunobi& Emezie 2016). Odu and Omosigho (2016) observe that since the penetration of digital resources, there has been a steady growth of online access to information which has transformed the whole concept of libraries into a global-information-connected community. However, using digital resources to provide library services require initiatives to drive digital technology service to enhance digital literacy of academic librarians.

Initiatives towards Digital Technology Services of Academic Libraries in Nigeria

In the past two decades, there have been various initiatives from government agencies, non-governmental organizations and individuals towards library digitization in Nigeria. For example, the Nigerian government initiated the Management Information System (MIS) and Nigerian Universities' Network Modules (NUNET) programmes to automate and digitize library collections (Ayoku & Okafor, 2015). The National Universities Commission also initiated the Virtual Library Project through funding and provision of digital resources and services, such as computers, electronic resources, and smartphones as well as Internet services in higher institutions' libraries across the country (Ukwoma & Iwundu, 2016; National Universities Commission, 2017).

The National Communication Commission (NCC) and National Information Technology Development Agency (NITDA) supported academic libraries in thirty three universities across the country to boost research and learning capacity through the provisions of computers,

laptops, servers, Online Public Access Catalogue (OPAC)/Web OPAC and DVD (Ogochukwu, 2015; Premium Times, 2019). According to Anunobi and Emerie (2016), the Mobile Telephone Network (MTN) supported the university libraries in Nigeria through the provision of digital technology, computer hardware, software, the Internet facilities, cell phones, Personal Digital Assistant (PDAs) and other digital devices to boost academic and research activities. In addition, the Librarians' Registration Council of Nigeria (LRCN) in its guidelines on the "Minimum Standard for Academic Libraries" states that a minimum of 15% of the recurrent budget of academic institutions should go to the library, while 10% of Internally Generated Revenue (IGR) of academic institutions should also be set aside for the provision of electronic resources (LRCN, 2014).

However, there are still challenges to acquire knowledge of digital technology to advance digital technology revolution despite the numerous initiatives (Anyim, 2018). These challenges are more persistent in some parts of Africa especially in Nigeria (Raju, 2014; Alriyaee, 2017; Raju. 2017). Despite several efforts made by government agencies and organizations to equip the university libraries with digital resources and services, there is poor digital literacy among librarians.

Benefits of Digital Technology Revolution in Academic Libraries

Digital technology revolution brings significant benefits to the users through the following features:

i. Improved access digital libraries are typically accessed through the Internet and other digital technology services. They can be accessed virtually from anywhere and at any time. They are not tied to the physical location and operating hours of traditional library.

ii. Wider access: A digital technology services can meet simultaneous access

requests for a document by easily creating multiple instances or copies of the requested document. It can also meet the requirements of a larger population of users easily.

iii. Improved information sharing. Through the appropriate metadata and information exchange protocols, the digital libraries can easily share information with other similar digital libraries and provide enhanced access to users.

iv. Improved preservation. Since the electronic documents are not prone to physical

wear and tear, their exact copies can easily be made, the digital libraries facilitate preservation of special and rare documents and artefacts by providing access to digital versions of these entities. Functional

Challenges of the Fourth Industrial Revolution in Academic Libraries

Challenges of the fourth industrial revolution in academic libraries in developing countries have led to a wide gap in the way information is delivered with digital technologies (Odu & Omosigho, 2017). However, in the context of this paper, the major challenges identified are as follows:

Poor Digital Literacy Competence: Digital literacy competence enables librarians in academic libraries to make use of digital technology revolution to participate in new social and intellectual order (Elmore, 2014). However, librarians with poor digital literacy will not be able to access computers and databases which can lead to serious resentment in the delivery of information services. Being digitally literate has become a requirement for deriving maximum benefit from digitized resources without which librarians will be confronted with a wide gap in meeting with the changes of 21ˢᵗ century in

information delivery (Shopova, 2014). The benefit of digital technology revolution is to enable librarians working in academic libraries to demonstrate ability to evaluate and use information critically from relevant and authoritative sources online (Coldwell-Nelson, 2013). However, failure of some librarians in academic libraries to develop digital competence poses a big challenge in achieving the goals of meeting contemporary society's digital revolution and information delivery.

Inadequate Digital Literacy Training: Inadequate digital training and re-training have become a huge problem affecting librarians working in academic libraries in developing countries to carryout library functions in a digital environment (IFLA, 2017). According to Uwaifo and Azonobi (2014), poor knowledge of digital technology transformation as a result of inadequate training has hindered the effective use of digital technologies in academic libraries. Similarly, Rose, Eldridge and Chapin, (2015) maintained that many librarians working in academic libraries in African countries and particularly Nigeria still find it difficult to integrate digital literacy skills for effective information service delivery due to poor training.

Training is an important component to understand new digital technologies as they emerge, to identify the opportunities in them and manage the risks (Waller, 2016). Training in digital intelligence will grow over time as the new technology evolves. Azubuike, (2016) rightly maintain that new Information and Communication Technologies such as the Internet, online gaming worlds, artificial intelligence, robotics and 3D printing are evolving through digital revolution that require the adequate training of librarians. Without adequate training in using these digital technologies and services, academic librarians will be left behind in the digital age. However, due to poor digital training, many

librarians find it difficult to provide library services through digital objects such as text, images, video and audio, and with poor methods of access and retrieval and for the selection, creation, organization, maintenance and sharing of collection.

Poor Attitude and Perceptions towards Digital Literacy: While digital technology revolution can equip academic librarians with the skills to interact and communicate using digital technology, poor attitudes towards the use of digital technology remain a challenge (Ryan, 2015). Building digital skills requires technical, social and intellectual activities. The poor attitude and perception towards digital technology make it challenging to transform digital technology revolution and capabilities among librarians (Rouse, 2016). However, some academic librarians in developing countries are not competent to take on the challenging role of fourth industrial revolution in 21st century information service delivery (Abubakar & Adetimirin, 2015). They perceive digital technology as a threat to their jobs. Hence they are reluctant to embrace new technology. Many librarians lack confidence in the face of increasing information and media technology. This slows service delivery and retards productivity.

Lack of Digital Technology Awareness: Lack of awareness and understanding of new digital technologies such as mobile Internet access, cloud-based computing, the Internet of Things, digital data, artificial intelligence and an increase in computer-driven decision-making and other forms of automation have become a big challenge for librarians in recent times (IFLA, 207; UNESCO, 2017). Digital technology evolved as a result of change that has continually taken place in a technology-driven environment. Librarians require awareness and understanding of digital technologies as well as interaction with these technologies for decision-making

(Baharuddin, Izhar, Mohamad & Hasnol, 2016). Amid these changes in digital technology, academic librarians are expected to continuously upgrade their knowledge and equip themselves in digital technologies to serve twenty-first century library users. According to Baro and Asaba (2010) and Ochezona (2015), lack of digital technology awareness is still observable among librarians in developing countries including Nigeria in transforming digital content and technology for proper use.

Poor Usage of Digital Technologies: Poor knowledge of use of digital technologies such as ICT infrastructure, Internet, artificial intelligence, cloud computing and online access still remained a big challenge to transform library services. Oduwole and Sowole (2016) identify problems in the usage of digital technology revolution in Nigeria to includes lack of adequate digital skills among staff and users, low information literacy levels, media and computer literacy. Poor usage of digital technologies especially prohibitive costs in developing countries to gain access to the Internet is still frequent among academic librarians as identified by Salaam and Adegbore (2010).

Conclusion and Recommendations

The fourth industrial revolution in academic libraries is meant to bridge the prevailing information provision gaps in the teaching, learning and research needs of the users. This is because digital technology revolutions have become an essential instrument for development and advancement of librarians globally in the provision of effective library services. The digital technology revolutions have also become a standard tool which developed countries have adopted in their libraries to access, network and provide effective information services. the fourth industrial revolutions have transformed academic library service into a digital and virtual environment where books

and journals are now available as e-books and e-journals. However, many academic libraries in Nigeria are still lagging behind to transform digital technology services to facilitate easy access to information beyond the traditional information service delivery in the library.

Based on the gaps established from the literature review, the following recommendations on the way forward were made:

- Knowledge of digital technology should be strengthened and priorities for digital technology transformation to enhance productivity in the delivery of information.

- There is also the need to improve on the digital technology awareness in mobile Internet access, cloud-based computing, the Internet of Things, digital data and artificial intelligence to enhance an increase in digital technology driven decision-making for effective information system and services in the library.

- Knowledge on the use of digital technologies such as ICT infrastructure, Internet, artificial intelligence, cloud computing and online access should form part of the policy statement of academic libraries for digital technology revolution and transformation.

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