LIBRARY AUTOMATION
Concepts, Current Trends & Issues in Nigeria

THIS IS A PLACEHOLDER. IF YOU WANT TO HAVE AN ACTUAL STATEMENT HERE, YOU HAVE TO MAKE SOME CHOICES USING BOOK'S METADATA MODAL.

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Preface

This book provides an introduction to the key ideas, developments, current trends and issues in

library automation. Automation is the current trend and issue in libraries of developing countries

such as Nigeria. Automation refers to the use of machines or electronics in support or in place of

human workers to carry out operation(s) partially or fully. When machine used to support human

operation and human does certain operation in addition to initial instruction given to the machine

that is a 'partial automation'. But where machine used to replace human in an operation and the

machine does entire exercise without human interference after the initial instruction, that is a

complete automation, i.e., 'full-automation' and this is also refers to as mechanization,

computerization, robotic or artificial intelligence. Likewise, library automation implies the use of

machines or electronics in support or in place of human workers to carry out library operations.

Specifically, library automation implies application of computers and similar technologies to

perform traditional library housekeeping activities such as selection, acquisition,

cataloguing, preservation, reference, retrieval, circulation/dissemination and wholesome

control of information resources. Automation is used to reduce the amount of time, effort,

money, space and other resources devoted on repetitive activities done in the library and in

seeking perfection of the job done so as to serve users efficiently. Automation in Nigeria libraries

was slow from the beginnings but got momentum in 2000s. Academic libraries of tertiary

institutions both public and private are the forerunners of automation in Nigeria and some public

and private libraries followed them though most of the public libraries are lagging miles behind.

Kudos to TETFund (Tertiary Education Trust Fund) for supporting automation exercises in

most public tertiary institutions in Nigeria. Recently, in addition to what it been doing, TETFund

has supported retrospective conversion of projects/thesis across tertiary institutions in Nigeria and

inter-link of the exercise which our institution benefitted. The fund provided requisite facilities

and training for doing that.

More libraries in Nigeria are keying to the idea of automation as more and more libraries are

gradually automating their systems and services. This development makes most Nigeria libraries

wearing new faces, and the concepts of libraries gradually changing from mere wirehouses of

books to well-organized multimedia centres with variety of services both online and offline,

making the libraries the hybrid format.

As more and more libraries in Nigeria are gradually been automated, librarians will be confronted

with new set of challenges in their job and this is as a result of emerging concepts, trends and

issues in automation that libraries and librarians are yet to familiarise with. Thus, this book is

designed to equip librarians and other library staff with knowledge and techniques of some

current trends and issues related to library automation. The book provides a road map for libraries

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to think and take steps for partial or complete automation. It gives an extensive analysis of major

trends and issues of automation in the three critical stages of library and information work;

acquisition (input), cataloguing (processing), and circulation (output), and presents factors and

issues underpinning the complex process of automation in each of the stages of library and

information work with particular reference to Nigeria libraries. It also describes multimedia

resources, library networking, online cataloguing, and bibliographic databases in brief, and gives

practical ways to accomplish retrospective conversion of projects and thesis in the libraries

relating the experience of Niger State College of Education, Minna library which was supported

by TETFund. An entire chapter is also dedicated to discussion on the general challenges and

prospects of library automation in Nigeria. More importantly, review of empirical studies in

Nigeria related to chapter topic were made for each chapter to relate chapter discussion with what

appears in Nigeria, thus, the titling of the book 'Library automation - Concepts, Current trends

and issues in Nigeria'. Each chapter also includes a helpful review of the chapter (chapter

summary) that may be used as a revision tool to keep readers up to speed with chapter discussions.

Additionally attached to each chapter is review questions for self-evaluation of readers and again,

a self-evaluation form at the end of the book for general chapter evaluation for each reader to

complete and assess his/her ability of understanding the book.

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Foreword

The book ‘Library automation - Concepts, Current trends and issues in Nigeria' addresses

critical issues and opportunities of our time. It is a labour-intensive task put up by a dedicated

librarian who have years of experience in library and teaching careers. It is easy to read, thorough,

and well-written in bringing to light new ideas, trends and issies relating automation with specific

reference to Nigerian libraries. Undoubtedly, the author has put a lot of effort into writing a book

that will help librarians and students learn about and run automated libraries.

I won't think twice about recommending the book to lecturers and staff members of libraries and

students at all levels who are studying library and information science/technology.

I hope the author will continue to roll out more efforts in producing further works that will be

helpful to employees and scholars in the field of library and information science/technology.

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AIU Tanzania.

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Dedication

FOR GOD
AND TEAMING READERS

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Chapter One

Concepts, Rationale, Genesis and Transformations in Library Automation

1.1 Chapter objectives

After reading this chapter, readers should be able to:

1. Describe the concept of library automation
2. Identify basic rationale behind library automation
3. Discuss genesis and transformations in library automation
4. Describe some basic and trending concepts in automation
    i. Social media (WhatsApp, Facebook, Instagram, YouTube, Twitter)
    ii. 4IR (Fourth Industrial Revolution)
    iii. Internet of Things
    iv. Quantum Computing
    v. Edge computing
    vi. Cloud Computing
    vii. 3D Printing Technology
    viii. 5G Technology
    ix. AI Technology
    x. Blockchain Technology
    xi. Drone Technology
    xii. Quick Response (QR) code

xiii. Bing-Chatbot

xiv. Blended Learning

5. Itemise automated library operations
6. Mention advantages of library automation
7. Outline constraints of library automation.

1.2 Chapter introduction

In this chapter users are introduced to:

1. The concept of library automation
2. Basic rationale behind library automation
3. Genesis and transformations in library automation
4. Some basic and trending concepts in automation

i. Social media (WhatsApp, Facebook, Instagram, YouTube, Twitter)

ii. 4IR (Fourth Industrial Revolution)

iii. Internet of Things

iv. Quantum Computing

v. Edge computing

vi. Cloud Computing

vii. 3D Printing Technology

viii. 5G Technology

ix. AI Technology

x. Blockchain Technology

xi. Drone Technology

xii. Quick Response (QR) code

xiii. Bing-Chatbot

xiv. Blended Learning

5. Automated library operations
6. Main advantages of library automation
7. Major constraints of library automation

1.3 The Concepts of Automation and Library Automation

***HighLights*:**

« **General Meaning of Automation**

« **Specific Meaning of Automation**

« **Meaning of Library Automation**

« **Samples of Automated Library Activities**

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The concept of using various technologies to the handling of information in library from development (information creation/acquisition) to processing, preservation, retrieval, dissemination and use is referred to as library automation.

Different terms are used to describe the use of machines in actualizing a task, these include but not limited to; automation, mechanisation, industrialisation, computerization, digitisation, robotic or artificial-intelligence (AI). So many tasks traditionally done by human are thesedays completely done by mechines. Some typical examples are; the task of a traffic-police on the road that is now completely done by Traffic Lightening Machine (TLM). Also a typical cashier's task in the bank-hall is now completely done by Automated Teller Machine (ATM). Critically, opening of doors to allow entrance in to hotels, offices and eminent residentials is also automatically done through the use of machine-sensory. Moreover, what is at the stake in Nigeria is electronic voting system which was demonstrated in some elections in Nigeria. This, certainty ease efforts and reduces cost, resouces, and time spent in aggregating total vote cast to know the winner of an election. Many more of these developments in present day society numerous to mention are abound and automatically done which implies the use of machines, a system known as automation.

Automation may be defined as the use of machines or electronics in support or in place of human workers to carry out operation(s) partially or fully. When machine used to support human opoperation and some part of operations performed by human that may be termed a 'partial automation'. But where machine used to replace human in operation and the machine does the entire exercise without human interference after the innitial instruction that may be termed a 'complete automation' (i.e. full-automation). This is sometimes refers to as mechanization, computerization, or robotic. Likewise, library automation implies the use of machines or electronics in support or in place of human workers to carry out library operations.

Specifically, library automation is the use of computers and related technology to carry out routine tasks associated with maintaining a library, such as **resource selection, acquisition, cataloguing, preservation, reference, retrieval, circulation, and dissemination.** Similarly, Tiwari (2014) buttressed that the term "library automation" refers to the widespread use of computers in the library to carry out some of the more traditional tasks like acquisition, cataloguing, circulation, stock verification, etc. Information retrieval, automatic indexing and abstracting, and networking are also covered in its preview. In addition to these, library automation is also having a significant impact on how libraries and librarians define their objectives and job descriptions through the use of telecommunications and reprographics technology. Automation is utilized in the library to decrease the amount of time, effort, money, and space spent to repetitive tasks as well as to improve the work done in order to better serve users.

Today's libraries frequently employ computers to do tasks that would otherwise be performed by librarians; some of the reasons for this are slated below.

1.4 The Rationale of Library Automation

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HighLights:

- « Improve Library Management
- « Facilitate Access to information
- « Cost Effective
- « Labour Saving
- « Speed and Promptness
- « Idea of Real-Time
- « Eliminates Duplicates
- « Ease & Accuracy in Data Manipulation
- « Enhance Library Collaborations

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The following are some of the guiding principles of library automation:

1. To enhance the library management system for the satisfaction of the office and users.
2. To make it easier for users to access library information sources.
3. To reduce labour and costs and increase efficiency in library operations.
4. To make library operations more swift and sure.
5. To introduce real-time (the capacity to react to several queries roughly at the same time) in the library.
6. To eliminate duplication, ease and provide accuracy in data manipulation in the library.
7. To enhance library collaborations (loan and exchange, interlink of resources and bibliographic databases, matadata, and meaningful ideas).

1.5 Genesis and Transformations in Library Automation

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HighLights:

« **Innovation of language**
« **Innovation of written techniques**
« **Innovation of the mass media**
« **Innovention of computers**
« **Integration of computers and telecommunication**
« **The Springs and use of Social Media & 4IR Technologies**

History of Automation in Nigeria

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Libraries are custodians of documented information resources. Thus, the beggining and revolution in information codification, preservation and communication reflects the genesis and transformations in library automation. The information revolution affected society as a whole in five different stages, each of which had an influence on how information resources were stored in society and notably in libraries.

The **first was the innovation of language** that permitted information communication verbally at the beginning and before the invention of written language. At this stage the idea of library might be thought but was yet unborn though this stage paved way for the invention of written language, preservation of what were written, and hitoto establishment of the libraries.

The **development of writing and printing processes during the second stage** allowed for the conveyance of a moderate amount of information across time and place. This technique brought about the invention and use of various mediums for writing from the initial clay tablets, parchments and papyrus to the discovery and use of papers. At this atage, the need for preservation of written resources (documented information/knowledge) turning out from the society particularly monarchs, and this brought about ideas of establishment of preservation centres and the libraries. From the beggining when clay tablets, parchments and papyrus were used for documentation of information, materials available in collection centres were in small number, but at the invention of papers and printig techniques collection centres particularly libraries saw dramatic change in the number of collections, large number of print materials were produced and sent to the libraries for preservation and use by the public.

The **third was the development of mass media**, which made it possible to store and communicate vast amounts of information more effectively. At the invention of mass media, libraries had opportunities of storing resources other than print materials, and at this point audiovisual section charged with the keeping of audiovisual materials mostly analogues then were introduced in the libraries. This was the beginning of the availability of electronic resources (e-resources) in the libraries but all analogue untill the ideas of the use of computers and digitisation came on board.

The **fourth was the invention of computers** that gave way to better formats for information inputting, processing, and outputting (retrieving) within a particular location at the beginnings but later extended beyond a particular location at the fifth stage when computers were integrated with telecommunications. The use of computers gradually introduced libraries to less dependence on print materials (papers) and gradually moving the society towards paperless operations. The introduction of computer technology that supported or replaced the old or manual way of operations of human endeavors led to the paradigm of automation in many organizations. In addition, this revolutionized library operations and services as well as the gathering, processing, and distribution of knowledge and information in general.

The **merging of the third and fourth innovations—computers and telecommunications—marked the fifth stage** of the information revolution and cleared the way for more effective and widespread methods of information distribution in each specific place. At the integration of computers and telecommunications, the idea of paperless operations recieved a boost and the idea of virtuality established generally in the society and the library in particular. Libraries began to be identified as online depository centres which resources can be tapped far and wide away from the location of the library and at any time ahead of normal opening hours.

Perhaps, when giving account of library automation, there is the need to recognise the efforts made by the past visionaries well before computers were invented and began to be used in the libraries. As far back as 1880, punched cards used in tabulating data were invented by Hollerith. The University of Texas library may have been the first to implement punched cards for circulation management in 1936. While in 1950, the Library of Congress produced catalogs on a unit record machine. Many libraries in the United States used this method to automate their operations. French also created the "Book Wheel" in 1958, which allowed students to flip books by pressing a pedal that spun a book table. Albert Cotgreave, another visionary, created a "Book Indicator" in 1863 that contained miniature volumes that represented books in library collections.

But in the 1960s, the development of computers allowed library automation to advance to a new level. As computers became more prevalent, Machine-Readable-Catalogues were created. Perhaps the greatest example of vision and focus on automation over past quarter century was the development and rise of the MARC format (Tiwari, 2014). In 1990, library automation received a boost. Libraries created integrated text based systems using micro/minicomputers in which normal library

housekeeping operations were computerized using the platform of library's databases. Since then, library automation had been what it was inline with the principles of MARC until 1990s at the advent of minicomputers and library networkings library automation undergone dramatc changes in library services and access to library resources that reflects redefinition of the library. Availability of minicomputers coupled with the introduction global networking - the Internet made information more accessible. Likewise, the introduction of libraries networkings made library resources more accessible to the users of libraries at different locations.

In keeping with these concepts, the Library of Congress spearheaded initiatives that aided in the development of OCLC and other bibliographic tools. Libraries now make swift efforts for cataloging and creating catalogue cards at reasonable prices, thanks to OCLC. Instead of getting cards, more than 80% of OCLC cataloguing participants download cataloguing records into their local library systems, while around 20% use the interlibrary loan system to share resources (Tiwari, 2014).

A computer-based automated library system is what is now seen. As opposed to the manual method of operations in libraries, a variety of computer-based automated libraries systems offer technical processing, an online catalogue, and assistance for circulation, giving customers with the information resources they require. The modern day integrated library systems are as a result of the integration of computers with telecommunications and inter links of library resources and catalogues. Open sources now available that provide multiple accesses for the users (i.e., Online-Public-Access Catalogue - OPAC). More so, today, the motives for library connectivities are gaining momentum with more libraries reaching out to the users far and wide across different locations even the globe (i.e., worldwide). This is earning libraries and librarians' new names such as; e-libraries/e-librarians, virtual-libraries/virtual-librarians, cyber-libraries/cyberians, etc. What also are appearing in the libraries in the last decade and would be massively deployed henceforth in the libraries to prone users to the use of library and services are more use of social media (such as WhatsApp) and other Forth Industrial Revolution (4IR) Technologies. In order to give library users access to materials from many sources, integrated library systems of today must be designed to not only provide modules for automating library operations but also to connect local systems with other information suppliers' systems, databases, and the Technologies.

1.6 History of Automation In Nigeria

Nigeria, the most populous black nation in the world, is not always left behind with technology. It has hardworking citizens doing well in technology. The likes of Jelani Aliyu, a Nigerian from Sokoto state and a senior creative designer General Motors company (the largest automotive manufacturing company in USA and one of the largest

in world), who designed Chevron Volt that was introduced in 2010. This vehicle was named the most fuel-efficient vehicle in January 2014 by the United State Environmental Protection Agency and was also ranked as the World's all-time best-selling plug-in hybrid in September 2018 (Kane, 2019). In addition to this, Aliyu led the exterior designing of the Pontiac G6. After all these, he was invited home (Nigeria) by the president to lead the country's automotive design effort and presently Director-General of the Nigeria Automotive Design and Development Council.

Also, to mention is Abdulhakim Bashar, a Nigerian from Katsina state, and the CEO Nigeria's Chiniki Guard, who wins **Top Artificial Intelligence (AI) Prize** at GITEX (Gulf Information Technology Exhibition). The GITEX is one of the biggest technology shows in Europe, the Middle East, Africa and Asia as at 2021 (Pantami, 2022). Bashar stood for his organization/Nigeria, contested with 750 contestants from 73 countries, in which he presented an **artificial intelligence-based security solution** for retail stores and supermarkets to monitor, detect, and alert shop owners of shoplifting and suspicious acts in real-time. This presentation came overall-best start-up in the artificial intelligence category.

Other to mention is Isah Aliyu Ibrahim Pantami, a professor in the field of IT/Computer Science, who contributed a lot in the field of IT/Computer science to an extent of been appointed by Saudi Kingdom to help drive IT in the country but later invited home (Nigeria) by Nigeria president and was appointed Minister of Communication & Digital Economy. He was the first to occupy the office when the ministry reworn new name and functions of digital economy. He made a lot of transformations and achievements in digitisation drive in Nigeria that affects all sectors of economy including libraries. Certainly, his efforts have facilitated and improved networkings in Nigeria, and directly or indirectly facilitated and improve Networkings in Nigeria libraries.

However, the earliest attempt at library computerization in Nigeria was recorded in the late 70s. As observed by Roknuzzaman (2006), the higher academic institutions of a country are pioneers in adopting and using ICT. Unsurprisingly, library automation in Nigeria was spearheaded by libraries of higher institutions - the academic libraries. Adegbore (2010) reported that University of Lagos, University of Ibadan, and Ahmadu Bello University, Zaria, all started computerization projects in the mid 1970s and 1980s. Agboola(date?) as cited by Uzomba et al (2015) stated that the greatest impetus to library automation in Nigerian university libraries came from a World Bank project which gave automation as one of its conditions for support. As a result, the National University Commission (NUC) presented one microcomputer and a four-user local area network version of the The Information Navigator (TINLIB) software to each of the 20 participating libraries in 1992. This was after an agreement had been reached between the NUC and the University Librarians that all Federal Universities should use common software (Ogunleye, 1997). However, the automation could not be sustained. Many libraries in Nigeria ran into one problem or the other due to the wrong choice of library

software. Obajemu; Osagie; Akinade and Ekere (2013) reported that the use of TINLIB software in some Federal universities had to be discontinued due to some technical difficulties, maintenance problem, poor revision policy and the prohibitive cost of processing and maintaining it. Umeluzor et al (2012) also narrated the frustrating experience of Babcock University with the XLib software and its vendor. They lamented that; the software served for some time and later became prone to several challenges which were insurmountable. It is therefore safe to assert that aside from University of Jos which adopted KOHA after a fire accident destroyed its legacy software (VIRTUAL ILS) many other Libraries also adopted KOHA in order to escape proprietary software that are more problematic than helpful. (Akpokodje & Akpokodje, 2015).

Libraries in Nigeria, especially academic libraries, are motivated by this spirit. ICT use in libraries in Nigeria started in the early 1990s. Although ICT usage in Nigeria has not made much progress at that point. But now, there has been a significant improvement, especially in Nigerian university libraries. It is important to acknowledge the TETFund's efforts for promoting automation in Nigerian academic libraries. Through these efforts, most academic libraries were able to engage users (staff and students) with academic exercise of accessing offline and online resources.

1.7 Some Basic Concepts in Library Automation

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HighLights:

- **Multimedia**
- **Library Softwares**
- **Library Networkings**
- **Cryptocurrency**
- **Electronic Grey Literature**
- **Reprographic Conversion**
- **Database & Metadata**
- **RDA (Resources Description and Access)**
- **Cybernetic, Cyberlibrary & Cyberian**
- **Web 2.0. / Library 2.0**
- **Social media (WhatsApp, Facebook, Instagram, YouTube, Twitter)**
- **4IR (Fourth Industrial Revolution)**
- **Internet of Things**
- **Quantum Computing**
- **Edge computing**
- **Cloud Computing**
- **3D Printing Technology**
- **5G Technology**
- **AI Technology**

« **Blockchain Technology**
« **Drone Technology**
« **Quick Response (QR) code**
« **Bing-Chatbot**
« **Blended Learning**

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New concepts are expectation of changes in life and daily experience in different fields of study. Libraries before now might not be in touch with some of the concepts to be discussed but as life changes in the field and innovations made to improve service delivery, new concepts begin to emerge, and this is a continuation in life. The most recent change in libraries is as a result of influence of different technologies in the field particularly information technology. Information technology, more importantly computer technology is mounting pressure on libraries for changes that cannot be neglected by libraries, and this is springing out some concepts new to the libraries. Some of these concepts though may be long born but still fresh in our libraries and are major discussions in the libraries opting for automation of activities and services, and also major discussions in the subsequent chapters of this book. Few of these concepts are:

1.7.1 Multimedia

Multimedia is a non-print informative resource that combines two more elements of accessing information contained in it. In computer science, multimedia is a combination of more than one digital media (audio, visual; text, graphics, animation, video, etc) used in computer application such as computer games, multimedia encyclopedias, thesaurus, dictionaries, books, etc mostly accessed online or packaged on CD-ROMs to be accessed electronically.

1.7.2 Library Software

A software is a computer programs term used to describe a set of instructions written by a programmer distinct from the manufactured hardware that is used to run the hardware. Computer hardwares are run with softwares. As computers process data, software is used to run the process. Some software are programmed to run the system components such as operating system while others are application programs designed to make computers process data and to apply computers to perform a specific tasks. Library softwares are application softwares designed to make computers perform specific tasks of the library. There are different kinds of library softwares, some examples of these are Compterised Documentation Services/Integrated Set of Information System (CDS/ISIS), Alice for Windows, NewGenlib, Troodon, etc. More examples of these are in chapter two ahead.

1.7.3 Cryptocurrency

Cryptocurrency is a virtual currency that is developed through mathematical encoding and decoding of computer protocol which has made it possible for huge amount of virtual currencies to be transferred over decentralized public networks, unintercepted and uncorrupted. In simple terms, cryptocurrency is computer-generated money that can be used to pay for transactions just like conventional money. There are quite a number of cryptocurrencies around the world examples of these is bitcoin. Many examples are in chapter two.

1.7.4 Electronic Grey Literature

Grey literature is recorded material that is available in a variety of mediums and formats but is produced in an unorthodox (unconventional) or semi-orthodox (semi-conventional) manner and frequently isn't formally classified, priced, or accessible through traditional bookselling channels. The majority of recorded information sources in electronic format that are semi-conventionally or unconventionally published but frequently not formally classified, priced, or accessible through conventional bookselling channels are known as electronic grey literature resources. Grey literature is evolving as a result of electronic communication and is now more broadly defined to encompass e-mails, faxes, blog posts, wikis, and podcasts. Grey literature is now more widely accessible online. Majority are Adobe Acrobat - PDF documents.

1.7.5 Reprographic Conversion

The term reprography signifies document reproduction or copying by any means especially through the modern techniques of digital scanning. Reprographic conversion encompassing quick service document reproduction; a process of converting hardcopies of materials to softcopies, normally to be accessed online or offline. Nigeria libraries are presently passing through the process of converting hardcopy research reports of graduated students from different institutions supported by tertiary education trust fund (TETFund).

1.7.6 Database

With the help of database management system software, a database is created and managed. A database is a sizable volume of digital information about a single subject or field that is correctly organized, updated often, and searched and retrieved quickly. Databank and database are occasionally used interchangeably. However, the latter phrase is more explicitly used to refer to a set of nonbibliographical data, often quantitative and personal information. Databases may be accessed and viewed online and can take the

shape of numbers, text, letters, or images. It is a repository of information that includes bibliographic records, abstracts, full-text articles, directory entries, photos, statistics, etc. It usually concerns a particular body of knowledge arranged to facilitate accessibility, updating, processing and transmission. An example of database is **Data Document Initiative(DDI);** www.icpsr.umich.edu/ddi. This is a project of social science community.

1.7.7 Resources Description and Access (Rda)

RDA is a well developed library cataloging code used to describes every single material in the library and an aid to accessing information resources. RDA metamorphosis from AACR2R - the revised edition of AACR2 in 2002. RDA was built to encompassing requirements for cataloguing many media including Portable Document Fomart (PDF) or coded Extensible Markup Language (XML). RDA provides a comprehensive set of guidelines and instructions for resources description and accessing encompassing all categories of media. Readers can learn more on RDA in chapter three.

1.7.8 Web 2.0 / Library 2.0

Web 2.0 refers to a group of server-based technologies that have transformed the web from a one-way publishing platform into a two-way medium. All Internet users are encouraged to exchange, work together, and participate in the creation of websites using these solutions. The emerging generation of online tools and apps is simply referred to as "Web 2.0." The Web 2.0 phenomenon has had a big influence on the information environment since it first emerged in 2004. It runs the library 2.0 platform. The notion of Library 2.0, as defined by Michael (2005), is one in which users are both content producers and consumers of knowledge. Library 2.0 is a library without walls and with active user engagement in the role of architects. The use of interactive, collaborative, and multi-media web-based technologies to enhance web-based library services and collections is what is meant by the phrase "Library2.0." According to Alonge (2014), the goal of Library 2.0 is to bring the library to the customers so that it can better serve them and to encourage professional collaboration among librarians.

1.7.9 Social Media

Social media are internet-platforms enhancing human social relations and information/knowledge seeking behaviors courtesy of the integration of computer and telecommunication technologies. Library 2.0 also leverage on this platform. Some of these platforms are;

- **WhatsApp**

Users of this instant messaging app for Android-based smartphones and mobile phones may freely send each other text messages, photos, videos, and other file types. Additionally, it permits the attachment of documents in various formats, such as Word, Excel, and PDFs.

- **Facebook**

This is a free social media website that allows users to register and create profiles on the site. It allows upload of videos, photos, sending of messages and keeping in touch with others.

- **Instagram**

This is an online photo-sharing service. It allows users to edit and upload pictures and short videos through a mobile app. The use of the Instagram App in a library should be through visual content to allow library users know what the library is all about.

- **Youtube**

YouTube is a social networking site and online video sharing service. Videos of events, seminars, special speeches, etc. are frequently shared through this method. Users may submit videos, post comments, and make playlists on YouTube channels.

- **Twitter**

Users of Twitter, a free social networking microblogging site, may publish brief messages known as tweets. Using a variety of platforms and devices, users may broadcast tweets and follow the tweets of other users.

This is a computing library programme presently designed to provide ease of use and efficiency in service delivery.

1.7.10 Fourth Industrial Revolution (4IR)

The Fourth Industrial Revolution, also known as 4IR or Industry 4.0, refers to the fusion of the physical, digital and biological worlds. It was first coined by Prof. Klaus Schwab, the founder & executive chairman of World Economic Forum (WEF) which he described as a fusion of technologies blurring the lines between the physical, digital and biological spheres. The idia of 4IR commenced commenced toward the end of the first decade of the 21st century (Kimberley, 2019). The 4IR ushered in the idea of virtuality and virtual world. Deloitte (2020) said 4IR refers to the marriage of physical assets and advanced digital technologies - the Internet of Things (IoTs), Artificial Intelligence (AI), robots, drones, autonomous vehicles, 3D printing, cloud computing, nanotechnology, and more - that comminicate , analyze, and act upon information, enabling organization, consumers, and society to be more flexible and responsive and make more intelligent, data-driven decisions. Details of 4IR are in chapter four.

1.7.11 Internet of Things

The term Internet of Things (IoT) refers to the connection of an increasing number of devices and objects over time to the internet. The IoTs bridge between physical and virtual worlds through data processing and exchange to enhance daily businesses. According to Pantami (2022) the datafication of society is a result of the large amounts of data being generated in virtually every industry, and IoTs pay a significant role in this.

1.7.12 Edge Computing

This is a combination of different technologies including grid computing, cloud computing and internet of things (IOTs). This technology brings the internet closer to users, and requires less time and bandwidth to recieve, process and stores data. It has capacity to stores data that is too large to be stored on network and transmits it on cloud computing.

1.7.13 Cloud Computing

Clooud computing means storing and accessing data and programs over the internet instead of your computer's hard drive (Griffith, 2013). At the moment, the internet's primary uses are cloud computing. The term "cloud" evolved from the standard computer language use of surrounding a network of linked computers in a border like a cloud. A consumer can use a computer linked to the internet to request computing resources from a provider utilizing the cloud computing model (Rajaraman, 2020). The word "cloud" comes from natural occurrences that God created, with clouds serving as the primary repository for the world's treasures. These treasures can all be found in clouds and accessible from wherever in the globe. This is similar situation with the cloud computing where a provider serves different outlets of computers. When access made public (to anyone), that is public cloud. But when access restricted for exclusive use of single organization, that is private cloud. And if access extended to cover a community, it is community cloud. Hybrid clouds on the other hand, are created when two or more of these entities (private, public, or community cloud) are combined, and also known as cloud kinds.

With cloud computing, a client may use any contractual computer resource including storage capacity, processing power, or application software directly from a service provider. People have the ability to save emails, place and retrieve information online, thanks to this method. Due to the quick development of computer and telecommunications technology, modifications in the information management paradigm, and the availability of surplus computing resources with large firms like Amazon and Google, cloud computing has become a reality.

1.7.14 3D Printing Technology

This new output tool turns digital information into tangible items. Worldwide, 3D printing technology has attracted a lot of attention as a quick prototype and small-scale production tool.

1.7.15 Technology

The term 5G Technologies is used to describe the 5th Generation cellular communication technology. 5G is linked with big data, internet of things, broadband and mobile communication. 5G is the fastest network for now.

1.7.16 AI Technology

Artificial Intelligence technology is a computer technology that deploys machines to do intelligent exercises man does with high capability and proflciency, the capacity to reason, understand information, and acquire skills in order to use them. The core of artificial intelligence is the capacity to create intelligent machines that see, think, and behave like people. Artificial intelligence (AI) functions including speech recognition, language processing, work schedules, and autonomous performance are present in the majority of our computers and smartphones today.

1.7.17 Block Chain Technology

Block chain is the ledger or record keeping side of a transaction and subsequent transactions. It records the date, time, participants and any other contractual agreement in transactions. Information stored as part of transaction cannot be modified unless agreed by both parties. It involves the storing of information in a distributed tamper - resistant setting.

1.7.18 Drone Technology

Drone is an emerging technology for document delivery. Drones are controlled by remote ground control system referred to as a ground cockpit. Drones were first used for military operations, but other companies have started using it in delivering of parcels to their customers and for other commercial purposes. Drones could be used for delivery of documents and transportation of books to designated areas because they have anchor to carry books and can save time and effort in doing this.

1.7.19 Quick Response Codes (QRC)

Quick Response (QR) code is a type of two-dimensional bar code appears as a small white square with black geometric shapes in which data are encoded based on the position and combination of the black spots read by smart phones\androids with camera. Quick Response (QR) is often referred to as mobile code. It is referred to as QR because it quickly responds to the query, i.e. allow the contents encoded in to be decoded at high speed. The idea behind the development of the QR code is the limitation of the barcode information capacity (can only hold 20 alphanumeric characters). Quick Response (QR) code system consists of a QR code encoder and decoder. The encoder is responsible for encoding data and generation of the QR Code, while the decoder decodes the data from the QR code. The popularity of QR codes is growing rapidly across the world. Nowadays, mobile phones with built-in camera are widely used to recognize the QR Codes. This attraction is as a result of tremendous impacts derive from it and the efficiency of usage. Details of this are in chapter four.

1.7.20 Bing-Chatbot

In the academic world, educators and researchers are always seeking ways to improve their research, writing, and critical thanking skills. One tool that can assist in this exercise is the Bing-Chatbot. Bing-Chatbot is a conversational Artificial Intelligence tool that uses natural language processing to answer queries and provide information. It answers queries presented to it and provide users with information required with it. The use of Bing-Chatbot tool is an efficient and fun way to get quick answers to questions without having to do extensive research in finding answers to the questions or roving for the answers. Bing-Chatbot is a fascinating tool that helps in accomplishing literature review in research. Libraries can use the tool to assist researchers in accomplishing literature review. Researchers turn to the libraries with the tedious task of finding literature sources to be review for new research, Bing-Chatbot is a tool that can be deployed to easily accomplish this task. It is an ultimate tool for accelerating literature review process. Details of this are in chapter four.

1.7.21 Blended-Learning

Blended Learning is in forefront in most institutions across the world and the libraries also playing vital role in this direction. Blended learning has emerged as the latest educational programme making impact in present day classroom teachings. At all levels of education, primary, secondary and tertiary, blended learning is used to bring the digital world and in-class teaching together. Blended learning signifies the use of technology, especially information technology, in support of classroom teachings. According to William (2019) blended learning uses technology to combine in-class and

ou-of-class learning, maximising the educational impact for students as a result. The tremendous impacts of blended learning are gradually known to educationists as acceptability of blended learning by educationists keeps rising. Blended learning while retaining the traditional student-teacher format breaks the 'one way conventional teaching format' to 'multiple formats', the combination of conventional and nonconventional (virtuality). It has taken education beyond the physical classroom and allowing students to learn at their pace, anytime, anywhere. Details of blended learning are in chapter four.

1.8 A View of Automated Library Operations

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HighLights:

« **Resources Acquisition Exercise**

« **Resources Cataloguing Exercise**

« **Resources Dissemination Exercise**

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An automated library is one in which the main operations of the library, such as acquisitions, cataloguing, circulation, and serial control, are managed by a computer system. Information work is often tackled from three sides in any information organization: input, processing, and output. This may be translated into acquisition, cataloging, and dissemination in a library. When a library is completely automated, all these tasks are carried out by computers without much assistance from humans thanks to programming. Below, we consider each of these automated functions.

1.8.1 Resources Acquisition Exercise

Acquisition refers to the selection and acquiring of various resources for the library, including printed and non-printed materials, books and non-books, through purchases, donations, loans, exchanges, and other means. This task entails the selection of materials, ordering them, receiving them, verifying their bibliographies, and registering them in the library. Computers are used to enable all of these services. Libraries communicate with users using interconnectivities, particularly the internet, to ascertain their requirements. They can then utilize e-transactions to seek these needs from suppliers or dirrectly from publisher or author. Automation gives libraries the chance to connect with resources immediately available on databases or produced by the publishers. E-publishing and e-books, journals, magazines, and newspapers, as well as many types of softcopies that libraries may purchase and distribute are made possible by automation.

1.8.2 Resources Cataloguing Exercise

The primary goal of cataloguing is to create a tool that will be used to retrieve library materials, which typically includes bibliographic description (descriptive cataloguing), subject analysis and classification (subject cataloguing), and all the tasks involved in getting items ready for the shelf. Nowadays, computers are used to assist the majority of these workouts quickly and efficiently. The majority of libraries have switched to computerized catalogs nowadays. Automated catalog, often known as a machine-readable catalog or digital information, generally refers to a computerized catalog. Examples include Computer Output Microform Catalogue (COMcat), which is available on microfiche or film, Machine-Readable Cataloguing (MARC), which is available on CDs, and Online Public Access Catalogue (OPAC), which may be accessed over the internet from many locations. In general, the OPAC has made it easier to browse through numerous library documents. Users can search the database catalogue of a certain library associated with from the workstation or computer terminal, including whether or not they are on loan. Using a computer application has made it easier to perform similar tasks, such as indexing and creating other bibliographies that are used to access information in the library.

1.8.3 Resources Dissemination Exercise

Initially, topic lists were classified and preserved as part of the cataloguing process using library automation and were accessed within a particular area (offline). However, as time went on, the concept of telecommunications (the network) and computers being integrated, then, computers were utilized to fulfill user demands outside of the library. Information distribution in automated libraries today mostly relies on computerized circulation. Users now have the option to use libraries at any time (all hours), with barriers and distances abolished. Users can access the library they are affiliated with depending on their connectivity (LAN, WAN, or Internet). The charging and discharging (borrowing and returning of library materials) is a significant issue in circulation. A variety of library resources are loaned to users and automatically returned to the library by remote sensing of users' cards thanks to the introduction of artificial intelligence systems in libraries that are fully automated. Due to this advancement, library collections are now accessible on weekends and holidays. Fast tracking of library data, control, and delivery of overdue notifications to defaulters have all been made possible through automation.

1.9 Advantages of Library Automation

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HighLights:

« **Efficiency & Effectiveness in Service Delivery**

« **Easy & quick acquisition, processing, and transmition of information.**

« **Quick response to requests and searches**

« **Creation and upkeep of internet access points**

« **Provided Multiple Access Points**

« **Access to information resources in a variety of formats**

« **Access to information resources from various sources (locations) globally**

« **Attainment of real-time, the capability of attending several users at almost the same time.**

« **Preventing unnecessary duplication of information resources and services & saving time, money, effort, & space.**

« **Flexibility in moderating and updating metadata**

« **Possibility of storing huge amounts of information and quick retrieval when needed.**

« **Improved library partnerships, library goods and services enabled globally.**

« **Establishment of paperless and virtual presence.**

« **Improved record keeping and display in libraries.**

« **Facilitated organisation of library resources.**

« **Facilitated consistency in catcatalogues & interlink of catalogues**

« **Saves cost in library operation and makes room for other things to be done with the money.**

« **Boosted library patronage and users participation worldwide.**

« **Promoted readership activities across the world.**

« **Foster library-users bond all over the world and integration of activities**

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Information technology was leveraged by modern libraries to deliver excellent services that were available everywhere. It is impossible to overstate the advantages associated with this, however some are:

1. The delivery of services at the library became more effective and efficient thanks to library automation. The extent and depth of services offered by libraries have expanded, and the associated costs have decreased, thanks to an automatic management of activities with high rates of speed and error reduction.

2. In libraries, automation made it possible to easily, quickly, and more effectively acquire, process, and transmit modest amounts of information over long distances.

3. Automation has made it possible to respond quickly to any requests or searches made by library customers.

4. Automation allows for the creation and upkeep of internet access points like OPAC.

5. Automation has provided multiple points for accessing library materials. Author, title, subject, series, ISBN/ISSN, etc. are just a few of the various access points it

has provided chances for.

6. Automation has made it possible to access information resources in a variety of formats (audio, video or audio-visual).

7. Automation has made it possible to access an infinite amount of informational materials from various sources and locations throughout the globe.

8. Automation gave rise to the concept of real-time, which is the capability of attending several users at almost the same moment without prejudice, because it is interactive, it is user-friendly.

9. With automation unnecessary duplication of information resources and services is prevented, thereby saving time, money, effort, and space in the library.

10. With automation flexibility in moderating and updating metadata attained. Automation has made it possible to update bibliographic information and other library information resources quickly and flexibly.

11. Automation has made it possible to store huge amounts of information and to be quickly retrieved when needed because the electronics used have far larger memory capacities than the traditional shelves and are fast in recalling resources requested.

12. Automation has improved library partnerships. The trade of library goods and services is enabled globally.

13. Automation has made it possible for libraries to establish information requirements via the use of paperless and virtual presence.

14. Automation has improved record keeping and display in libraries. It features improved user statistics as well as record keeping and display, including lists of list-on-order, new arrivals, and collection records. It has made it easier to quickly track down records of loaned items and give defaulters late reminders. Due to the fact that it contains backups, it is reliable and capable of recovering data.

15. Automation has facilitated organisation of library resources. By using a robotic system, it has made it easier to organize the library resources to the patron's satisfaction.

16. Automation has facilitated consistency in cataloguing of library materials and interlink of library catalogues across the world - the union catalogue.

17. Automation saves cost in library operation. It makes room for other things to be done with money that would have been spent on recruiting or hiring a large number of staff by reducing the number of workers who may be admitted for a job and the size of the library overall.

18. Automation has boosted library patronage and users participation worldwide. More number of users within the location of the libraries and far away log in the libraries websites to establish their presence and utilisation of library resources.

19. Automation has promoted readership activities across the world. Young and old, students and non-students, frequently search for reading materials and utilized them.

20. Automation has foster library-users bond all over the world and integration of activities for better performance.

1.10 Constraints of Library Automation

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HighLights:

« **Electronic equipment's fragility.**

« **Adaptability to swift vanishing and vulnerable to virus attack.**

« **High cost of equipment.**

« **Nonexistence of technicians in the libraries.**

« **Inadequate power supply and frequent outage.**

« **Inadequate IT infrastructure.**

« **Lack of IT professionals in libraries**

« **Prevalence of illiteracy**

« **Artificial Information overload resulting from inappropriate organization of e-resource.**

« **Inadequate budgeting of money and resources for effective and consistent running automated libraries.**

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The effective ally in enhancing library service delivery is information technology. This is only feasible if information seekers and librarians make good use of the opportunities provided by IT. Although IT resources and facilities sometimes experience strange issues, most of the issues that are associated with them are the result of the people administering and using them. As a result, there are three sources of limitations for library automation: the IT infrastructure, the library administrators, and the library's patrons. Accordingly, some of these restrictions are described below.

1. Electronic equipment's fragility, which makes them quickly dated. Because digital information is brittle and susceptible to corruption, there is rising fear that digital resources won't endure in useable form in the future.

2. Electronic resources' adaptability causes them to vanish swiftly. The use of IT for information handling is associated with some preservation and security risks. For example, the loss of information resources due to a virus attack or a system outright failure can result in a setback for the library where there aren't adequate backups.

3. High cost of IT equipment and little funding for libraries in some areas. Most often, lack of funding for upkeep of the existing libraries has resulted in the collapse or closure of many libraries, particularly in poorer nations where maintenance culture is poorly handled. Some libraries struggle with subscription maintenance fees, which leads to the provision of epileptic services.

4. Inadequate or nonexistent technicians nearby the libraries This resulted in a variety of issues, including maintenance issues.

5. Power outage: Automation of libraries is hampered by a lack of energy or an intermittent supply of it, particularly in nations like Nigeria. In automated libraries, a

steady power source is essential. Contrary to traditional libraries, automated libraries require a steady source of electricity to run the electrical features that make them unique.

6. Inadequate IT infrastructure for high user density in, majority of libraries. This frequently applies to libraries in poorer nations.

7. Lack of IT professionals working in libraries is a challenge for the workforce.

8. Prevalence of illiteracy on consumers' parts. The communication system in libraries is supported by networks because of its capacity to give information to those who are looking for it, especially in third-world nations where illiteracy is rife.

9. Automated (electronic) libraries are overloaded with information as a result of the chaos brought on by inappropriate organization of e-resource. Libraries nowadays are looking for the most effective, inexpensive ways to manage and make use of the ever-expanding information base. Obtaining, storing, and transmitting information resources are a common task for many electronic libraries, although few are committed to the task of promoting comprehension. Resources, especially e-resources, are seldom filtered at the point of collection, which leads to the accumulation of redundant and irrelevant information resources, which is referred to as information overload in libraries.

10. Inadequate budgeting of money and resources is underpinning effective and consistent running of automated libraries in most underdeveloped countries which Nigeria is a part. Automating library actiactivities is a nice one, but on the other hand, sustainability is much better. Many e-libraries are off-way because of no money to sustain subscription of data and other important facilities to keep-way the libraries.

1.11 Chapter Summary

This chapter covers:

- The concept of library automation
- Basic rationale behind library automation
- Genesis and transformations in library automation
- Some basic and trending concepts in automation

§ Social media (WhatsApp, Facebook, Instagram, YouTube, Twitter)
§ 4IR (Fourth Industrial Revolution)
§ Internet of Things
§ Quantum Computing
§ Edge computing
§ Cloud Computing
§ 3D Printing Technology
§ 5G Technology
§ AI Technology
§ Blockchain Technology
§ Drone Technology

§ Quick Response (QR) code
§ Bing-Chatbot
§ Blended Learning
o Automated library operations
o Main advantages of library automation
o Major constraints of library automation

1.12 Evaluation

§ Describe the concept of library automation.
§ Identify five basic rationales behind library automation.
§ Discuss genesis and transformations in library automation in five lines.
§ Describe five basic and trending concepts in automation affecting library automation.
§ Itemise five automated library operations.
§ Mention five advantages of library automation.
§ Outline five constraints of library automation.

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6

Chapter Two

Current Trends and Issues of Automation in Library and Information Resources Acquisition Exercise
[Collection Development - Input]

2.1 Chapter objectives

After reading this chapter readers should be able to:

i. Identify various media resources.
ii. Outline elements of multimedia resources
iii. List steps in multimedia resources selection
iv. State methods of acquiring multimedia resources
v. Mention criteria for selecting multimedia resources.
vi. Categorise library software.
vii. Outline major participants in Library Software Selection
viii. Enumerate library software selection aids.
ix. List procedures for Selecting Library Software
x. Explain the term cryptocurrency.
xi. Identify types of cryptocurrencies
xii. Give account of emerging economy of cryptocurrencies in different nations
xiii. Enumerate values of cryptocurrency usage in collection development in Nigeria libraries
xiv. List type of electronic grey literature resources to be collected and packaged for home (Nigeria) use.
xv. Identify elements to be considered for the collection of electronic grey literature resources for home use.

xvi. Express ways through which electronic grey literature resources should be collected for home use.

xvii. Mention ways through which electronic grey literatureresources should be packaged for home use

2.2 Chapter introduction

In this chapter readers are introduced to:

i. Various media resources
ii. Elements of multimedia resources
iii. Procedures in multimedia resources selection
iv. Criteria for selecting multimedia resources
v. Methods of acquiring multimedia resources
vi. Categories of library software
vii. Participants in Library Software Selection
viii. Library software selection aids
ix. Procedures for Selecting Library Software
x. The concept of cryptocurrency
xi. Types of cryptocurrencies
xii. Account of emerging economy of cryptocurrencies in different nations
xiii. Values of cryptocurrency usage in collection development in Nigeria libraries
xiv. Electronic grey literature resources collection & packaging for home (Nigeria) use
xv. Type of electronic grey literature resources to be collected and packaged for home use
xvi. Elements to be considered for the collection of electronic grey literature resources for home use
xvii. Ways through which electronic grey literature resources should be collected, and
xviii. Ways through which electronic grey literature resources should be packaged for home use.

2.3 Multimedia Resources and Multimedia Selection & Acquisition Exercise

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***HighLights*:**

« **Concept of Multimedia**
« **Genesis of Multimedia**

« **Elements of Multimedia**
« **Categories of Media Resources**
« **Selecting Multimedia Resources**
« **Criteria for Selecting Multimedia Resources**

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In computing, multimedia means using sound, pictures and film in addition to text on a screen or packaged on CD-ROMs to be display and watch on screen. Multimedia is an area of computer science that deals with computer controlled integration of two or more features of audio (sound), visual (graphics, drawings, images,) text, animation, etc to process, present, store, and transmit information digitally. Now a days, multimedia is used in most fields like entertainment, gaming, fashion, advertisements, business, education, science and technology, library, to mentioned a few.

2.3.1. Genesis Of Multimedia

Multimedia did not suddenly appear. The way computers were previously understood has altered as a result of this technology. The first computers were known as specialized tools for mathematical problem-solving, that is, for calculations and analysis. And this was the situation in the 1960s when mainframe computer terminals were utilized to manage enormous databases and financial information. Later in 70s computer terminals were used for publishing and information management which also the real beginning of automation in libraries using modern computers. In 1980s, desktop computers emerged and were used for word-processing, spreadsheets, games and films. With this development, computers became more than just a fancy typewriter or automated record keeper. And this was the beginning of multimedia technologies. Multimedia first emerged in 1980s when desktop computers became more prevalent in businesses, schools, and homes (Kumari and Sherawat, 2016).

The developments in multimedia came at high rate and acceptability as it allowed animation, complex graphics, sound files and films to be included in presentations, as well as improving job performance, information delivery and entertainment.

2.3.2 Elements of Multimedia Rresources

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***HighLights*:**
Text
Graphic
Audio
Video
Animation

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The various features identified with multimedia resources make them highly acceptable by the users. The definition of multimedia preceded as combination of multiple elements more than one like texts, graphics, audio, videos, and animation. These are the elements of multimedia and are briefly looked at below:

1. **TEXT**

Text is written form of a speech. Text comprised words and figures used to communicate information to persons. Good use of texts in multimedia presentations will help to communicate message clearer to the users. Word processing software like MS-Word, Office Libre, OpenOffice-Writter, etc are used to create textual data in computers.

2. **GRAPHICS**

Graphics are sketches and images that are used to communicate and entertain users. Graphics, images in particular are important component of multimedia. Information communication is much easily understood and remember if it is presented though images or images used to support the presentation. Now a days children prefer using books with images because they facilitate the grasp of discussions in the book.

Creating grgraphics in multimedia involves inserting it or selecting it with the mouse and then making it use the Hyperlink button. The use of a border around the graphic makes it clear that the graphic is hyperlinked. Also, the images used in multimedia applications are sometimes photographs converted into digital forms through the use of input hardware such as scanners, mobile cams, Web Cameras, Digital Cameras, and other image generating software.

3. **AUDIO**

Audio is connected with hearing or sound. Audio is most important element of multimedia. Text and graphics without sound are useful during presentation in front of spectators. But in the absence of presenter before the spectators, sound plays much role in the grasping of idea or massage of the presenter. A very good example is viewing of a packaged educational CD-ROM. Learning is more facilitated in viewing educational CDs with audio element than those with text or graphics alone. Some book materials today are accompanied with CDs to allow opportunity for this.

To create sound in multimedia application, first is to record sound and play it according to the animation in the presentation. Moreover, the present computers systems have inbuilt applications that capture audio and video directly.

4. **video**

Video is connected with hearing and viewing. Video displays record of events. Video is one of the powerful allies in multimedia resources that convey information in more facilitating manner. What facilitates users of automated library is the element of video in multimedia resources that constitute it.

Variety of devices are used to capture video, they include; digital camera, web camera, mobile phone, etc.

5. **Animation**

Animation is still images displayed quickly with an impression of continuous movement. It is a visual modification over time to give an impression of real or staged events. Animation is most used for entertainment though also educative. The key element of arousing the interest of young users of libraries is through collection and dissemination of animated multimedia resources. Animation adds values to multimedia applications and presentations. Presentations are livelier when animation included.

2.3.3. Categories Of Media Resources

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HighLights:

Media Bibliography
Computers & Accessories
Televisions & DSTV
Recordings/Audiotapes
Videotape Recordings
Disc Recordings
Slides
Motion Pictures
Microforms (Microfilms/Microfiches)
Filmstrips
Books
Periodicals or Serials
Pamphlets
Archives & Documents
Maps and Charts
Pictures
Kits
Programmed Instruction
Transparencies
Simulation and Games
Models/Realia

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Multimedia belongs to a group of media resources in the library. Multimedia resources are non-print informative resources with a combination of more than one digital media (audio, visual; text, graphics, animation, video, etc) used in computer application such as computer games, multimedia encyclopedias, thesaurus, dictionaries, books, etc mostly accessed online or packaged on CDs. An automated library deals more with multimedia resources than libraries not automated because it has more avenues to

be accessed (audio, visual, vedio, animation, etc) rather than normal single way of accessing traditional libraries not automated.

In teaching, art, libraries and the likes, multimedia means using several ways of giving information or several different media. Libraries collect different media resources for the benefits of their users. These resources are now a days produced in both version; print and non print or soft copies. The following are some library media categories based on physical characteristics of them.

1. Media Bibliographies

Media Bibliographies contained records of various media in a particular library or group of libraries or available in the market. Media bibliography is a good means to be acquainted with media categories. Therefore, it is reliable selection aid for understanding and selecting vast aray of information media. Media bibliographies include metadata (catalogues, indexes, abstracts, and assorts of bibliographies) holding list of library collections and that are used to retrieve items from collection. Some of these are in book forms and in print and non print.

2. Computers and Accessories

Computers are used to handle administrative and recordkeeping functions as well as collection and housing of softcopies of information media. Information saved in computers are either online or offline. Onlie when information resources connected and accessible on net, and offline when information resources unconnected and unaccessible on net but reside on offline computer terminals.

3. Televisions/DStv

Televisions and DStv are Media kept in information unit of the libraries, particularly at news rooms. They are kept for listening of patrons to news and current happenings within the locality and around the world, and for entertainment.

4. Recordings/Audiotapes

These are sounds recorded on audiotapes and required listening devices to play them and access information in them. Tapes are available in open reel, cassette, and cartridge formats. The main information found in recordings is recitations, readings, speeches, storytelling, musics, etc.

5. Videotape Recordings

Videotapes unlike audiotapes, are sounds and visuals recorded on tapes that require listening and viewing equipment. Videotapes are available in open reel cassette ranging from 1/4 to 2 inches in width. Presently, videotapes are gradually facing out of libraries paving way for videodiscs.

6. Disc Recordings

Disc recordings are of different categories. Some are audio in nature and require listening equipment to access their contents while some are audiovisual that require both listening and viewing equipment to the content there in, a topical example is VCD and DVD. Information found on disc recordings is of the same type as that found on

videotape recordings but more presentable than videotapes because it is presented in digital format not analogue.

7. Slides

Slides are automated photographs that require viewing equipment. They are unlike filmstrips because they are automated and can be easily manipulated rearranged, augmented or deleted.

8. Motion Pictures

Motion pictures are films with silent or with sound tracks. Tracks are either magnetic or optical. Motion pictures require viewing and probably listening devices to operate them and to access information contained in them. Libraries usually keep motion pictures of 16-mm, super 8-mm, and regular 8-mm formats.

9. Microforms (Microfilms/Microfiches)

Microforms contained information that has been reduced photographically and requires viewing equipment such as magnifying device to be able to read information in them. Microforms are commonly available in microfilm formats and in reel and cartridge of 16 or 35-mm. Microfiches are also microforms available on sheets of film. Microform technique is used in libraries thoroughly before popularity of present day computers in the libraries to reduce the volume of piece of information so as to save space for the collection of more number of resources.

10. Filmstrips

A filmstrip is a continuous strip of photographic film containing a series of still pictures viewed separately on screen often when light shown on them. Filmstrips are predominately available in 35-mm half, single or double frame formats while others in 16-mm format. Some books are accompanied with short form of filmstrip usually 8 to 10 frames in length.

11. Books

A book is a written work published in print or electronic form (I.e. hard or soft copy). Most books in Nigeria libraries are prints bound with hard or soft back covers. However, electronic books (e-books) are gradually prevailing because of automation that gives libraries chances of accessing more number of electronic resources through subscription or free access points. Books are categorized as reference and non-reference. Reference books are meant to be consulted when there are needs to do so, e.g. dictionary, concordance, encyclopedia, recipe, etc. While non reference books are meant to be read cover to cover, e.g. textbooks, novels, fictions and story books, etc. Multimedia books are more cherished especially by children because they have multiple ways of accessing information in them; audio and visual as well as graphic and animation.

12. Periodicals or Serials

Periodicals are informative materials published on a regular or periodical basis with identified title and classified by volume, issue, and/or date. Periodical/regular publication makes them to be called periodicals, and serial numbering in volumes and

issues make them to be called serials. Periodicals are available in print and electronic forms. In some libraries periodicals are bound and are available in microforms. Very good examples of these are newspapers, newsletters, magazines, proceedings and journals, Text

13. Pamphlets

Pamphlet contains information on specific topic of interest not exhaustive in contents but to provide readers specific information. Pamphlets are usual piece of paper stapled together but unbounded. Some librarians refer to books not up to forty-five pages as pamphlets. Pamphlets covers handouts, handbills, lecture notes, sermons, and speeches at events, etc.

14. Archives & Documents

Archives are mostly inactive information resources preserved for time to time references. They are largely records of proceedings of activities, meetings and reports emanating from governments, agencies and nongovernmental organizations (NGOs). Documents simmar with archives are important media both print and none print containing specific and vital information such as files and official documents of governments and NGOs.

15. Maps and Charts

Maps are usually geographical resources while charts are pictorials, diagrams, blueprints, layouts, etc given specific information. Maps and Charts are both identified as single, unbound, and discrete in nature. Part maps are globes but really they are models of the earth, satellites, and solar system. Atlases are books of maps categorised as books.

16. Pictures

Pictures are photographs and works of arts drawn or painted. A collection of pictures are made on albums or mounted on cardboard to facilitate view. Pictures compiled usually became a compendium of art used for studying the development of visual art and stories of individual, society or situation.

17. Kits

A kit is a collection of two or more items on a particular theme or topic packaged to educate targeted users. Perhaps to capture well what kit really is, is defining it as a multimedia collection that contains variety of media or regalia dealing with a particular theme or topic. Kits are bulk of multimedia resources surfacing in automated libraries.

18. Programmed Instruction

Programmed instruction is a media, print or nonprit, designed to instruct the learner in a prescribed sequence. It is a pakaged modules use for teaching a specific course or training, or for use in computers.

19. Transparencies

Transparencies contained appreciable amount of data or information compressed into smaller volume through miniaturisation technique, when projected give an illusion of motion on a platform. They are usually mounted on 101/4 x 111/4-inch frames. Before

the technique of powers points presentation of computers, overhead transparencies are used extensively in education for presentations and trainings.

20. Simulation and Games

These are packages with wide range of learning and recreatory activities. They could be printed scenario or boxes with playing boards, counters, dice, etc. Some of these are extensively used by children to learn through play.

21. Models/Realia

Models are replica representation of real things. Normally, they are resources that cannot be brought to the library but seen as actual things for easier understanding. A good example of models is a globe. Globes are often considered as maps but in reality, they are models because they are representation of earth, satellites, solar system and galaxy. On the other hand, relias are real things brought to the library such as specimens, substances and art exhibitions, etc. Relias cover multitude of materials that vary in shapes and sizes, they include community resources, i.e., things from community.

2.3.4. Multimedia Resources Selection

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HighLights:

Selection criteria

Selection aids

participants in selection

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Collection of multimedia resources is gradually taking a stand in most of Nigeria libraries. As it is in collection exercise, all stakeholders most be consulted and involved in all processes. Before embarking on selection process, preliminary study of the users the selection targeted should be carry out. This is to determining some factors that would guide decision marking during selection. Some of these factors are:

1. Information needs of the users
2. Level and depth of experience of the users.
3. Population of the users.
4. Proportion between core area and general interest area.
5. The objectives of the institution of the users.

6. Library goals.
7. Collection development policy, etc.

Strong consideration of the factors above is necessary to guide against selecting inappropriate media and rejection by the users. However, tangible criteria should be set to guide selection. The criteria are factors to be considered within the media to be selected.

2.3.5 Criteria for Selecting Multimedia Resources

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HighLights:

« **Appropriateness**
« **Authenticity**
« **Scope**
« **Interest**
« **Organisation**
« **Physical Format**
« **Comprehensivenes**
« **Inclusions**
« **Cost**
« **Guaranty**

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The selection criteria to be considered in selecting multimedia resources include:

1. Appropriateness

This has to do with suitability of media to be selected to the needs of the users material is selected for. The needs of the users is utmost in any media selection either multimedia or not, therefore, it should be the first to be considered. When this is okay than other factors could be considered. Considering any factor before appropriateness will be useless exercise when material finally found not appropriate. And inappropriate materials, that is, materials not suitable to needs of users are of no use, therefore it selection is a futile exercise.

2. Authenticity

Authenticating of media to be selected is important to guide against selecting fake or pirated materials of unauthorised producers. To achieve this, you must make sure the material to be selected is from copyright owner or authorised publisher/producer or supplier.

3. Scope

This has to do with the content and coverage of the discussion of the media to be selected. The scope reflects the subject area and range of the users. Material to be selected should be within the scope of the users. Subject discussion and depth of

discussion should march with the levels of the users. For example, Mathematics is a subject offered in all levels of education (primary, secondary and tertiary) but the depth of discussion of the materials for different levels with not be the same, therefore, this should be noted in media selection. Let the material be relevance to current ideas and content to satisfy demands of users.

4. **Interest**

Stimulation (sensory appealing) and curiosity satisfaction of a media to be selected is added advantage after appropriateness to the needs ascertained. Stimulus media are largely utilized than non stimulus. As such within the range of appropriate media emphasis should be lay on most interested.

5. Organisation

Logical development of ideas and sequence of presentation are what to be considered here as well as quality of sound and visibility. Do not select unlogical developed and unrelated sequence materials because has no value to the understanding of users. More so, media with poor presentation with regards to quality of sound and visibility should not be selected.

6. Physical Format

Physical appearance of a media is one of the factors to be considered when selecting media resources. Ease in handling and preservation, attractive pa

and durability are aspects within physical format to be considered. On other hand, materials that may be difficult to handle or require rigorous training for use should be avoided alternative exist. More so, try to avoid unreactive packaged materials or filmsy constructed or would be difficult in maintain.

7. Comprehensiveness

While physical format speaks of external features, comprehensiveness deals with internal features in the material or the technical aspects. When selecting a media, especially multimedia, carry out a thorough checking to ensure all deserving internal features are all-encompassing. Sound and visual clarity of the contents, tone fidelity, effective structures and colours use be considered. Complete synchronisation of sound and image should not be compromised in selecting a multimedia. On the other hand, avoid media with tone distortion, fuzzy pictures, confused composition, and uneven synchronisation of sound and image. Confused composition also reflects state of morality of the contents of the media. Avoid all forms of immoral teachings by avoiding media containing immoral teachings. Media containing immoral sexual teachings, nudity, homosexuals and gyani be avoided.

8. Inclusions

These are additional special features to the existing features discussed earlier and above. Features such as descriptive notes of use, teachers/learners guide, pertinent accompanying materials, etc. are attractive parts of a media especially multimedia and should be observed.

9. Cost

A consideration on the price of materials is necessary to avoid going out of the budget and hitherto accumulation of debts. The price of an item or items should be affordable and in conformity with the budget. Lay much emphasis on less expensive commodities than expensive commodities where there are substitutes with even satisfactions, but standardisation should not be compromised.

10. Guaranty

Assurance for functionality of a media especially multimedia motivates selection of the media. Products of reputable producers/companies have more tendencies of functionality and should be considered before others. These companies have established product guaranty for buyers/customers to return back purchased product for replacement or refund in the event of failure of the product.

2.3.6. Multimedia Selection Aids

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HighLights:

« **Multimedia bibliographies**
« **Catalogues**
« **Indexes and abstracts**
« **Handbooks**
« **Leaflets**

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A publication used by librarians to develop a balanced collection that meets the information needs of library users is the selection aid. A good way for librarians to become acquainted with the media categories is through multimedia bibliographies. The category includes catalogues, indexes and abstracts, and handbooks/leaflets published by companies and agents for marketing products. The leaflets, apart from listing the titles provide other information such as name of producers and place of production, period (year), and price, etc. They are prepared with the aim of intimating customers the availability of products which come in two categories; those that list titles already in the market, and those that list forthcoming titles.

2.3.7. Participants In Multimedia Selection

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HighLights:

« **Acquisition Librarian**
« **ICT librarian**
« **Technologists**
« **Subject Specialists**

« **Library Users**

« **Producers & Agents**

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Multimedia selection is a professional duty jointly performed by **Acquisition Librarian** and **ICT librarian** as well as **technicians or technologists** attached to ICT unit. Librarians alone are not expected to discharge the task of selecting multimedia because they are not computer technicians/technologists expected to know the technological and pedagogical uses of various media. However, selection exercise either multimedia or not is not an exclusive exercise, it is jointly done with other stakeholders who are invited to participate. Other stakeholders that may participate in selection exercise are;

Subject Specialists: This group includes librarians qualified by virtue of specialized knowledge and experience to select materials and provide bibliographic instruction and reference services to users in a specific subject area or academic discipline or sub-discipline. Some of these librarians may have a combined degree (library science combined with other course, e.g., library science/Political science), first or second degree in library science and one in other disciplines. Others are professors, lecturers, teachers and learned individuals specializing in different subject areas and who are conversant with publications in their areas. This group of people are helpful in book selection because their knowledge of the subject usually extends to awareness of existing titles that could be selected.

Library Users: Users participation in selection exercise ensures good selection of materials. In academic or school libraries, users are staff, students, and other stakeholders in the institution. There is usually less criticism of the collection from the part of the users where they are involved in selection exercise. It might not be possible to acquire all media recommended by these groups. In such a case, the Acquisition Librarians alongside technologists in good faith decides on which ones to acquire or drop. However, since media acquisition is a continuous exercise in the library, the ones dropped may be re-considered in the subsequent exercises.

Producers or Agents: Producers and agents are progressive partners in multimedia selection. Producers and agents' intimate librarians of latest products. Agents are prefer because they deal with different producers and advertise different products from different producers, while producers advertise their products only left alone what exist in other places.

2.3.8. Multimedia Acquisition

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HighLights:

« **Purchase**

« **Donation**

« **Bequeath**
« **Legal Deposit**
« **Loans and Exchanges**
« **Internal Production/Generation**

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Media selection even though fundamental can be said to be a proposal while acquisition is the practical implementation. Acquisition is about making available resources in the point of use. In the context of the library, acquisition is to obtain media resources for the library or users of the library. Generally, in the library, acquisition of assorts of media is done through the methods below:

1. Purchase

This is the method of acquisition that requires the library to pay for the cost of materials before they are accessed or acquired. It means buying or procuring materials through cash payment, cheque deposit or e-transaction. Materials should be purchased from the right sources such as producers or publishers or their agents to save cost and to guide against acquisition of pirated copies and ultimate duping. Agents deal with different kinds of materials by different producers, buying through them will permit library receiving many titles from different producers within single source and save them from hardship of dealing with many producers or narrowed opportunity of dealing with individual producers.

2. Donation

Gifts, endowments and contributions from individuals, governmental and non-governmental organisations are another important source of acquiring media resources. This could be solicited or unsolicited for. Solicited, when library requests for the materials, and in this case, the library makes it clear the titles and/or nature of materials required. Unsolicited, when donors voluntarily offer gifts to the library without a formal request from the library. Effort should be intensified in examining unsolicited offers so as to drop unwanted (irrelevant) materials. The library should be bold enough to reject irrelevant or inappropriate materials to save the library from becoming a dumping ground for such materials and ultimately saving spaces to accommodate more of the appropriate materials. Donations either solicited or not, should be acknowledged by the library as a way of showing gratitude to the donors and paving the way for further opportunities.

3. Bequeath

This is closely related to donation. It is in the form of a will that take effect when the donor dies. In a nutshell, it is the act of giving to the library materials owned by individuals at the passing away of the owner who is the donor in this case. Individuals possessing assorts of media do this to guarantee the use of collection built by them even after they might have passed away especially in developed countries where private collections are common. This particular method of acquisition is not common in

Nigeria and other developing countries. Lawyers are usually involved in drafting and sealing agreements between donors and libraries concerned.

4. Legal Deposit:

This is also a donation but sometimes against the wish of the donor who may be the producer or publisher. It is a compulsory donation of materials (books and non-books; prints and non-prints) to the library of a particular area where materials are produced which is mandated by law, and failure to comply attracts sanctions. The National Library enjoys much of this which makes it known as Legal Deposit Library, because it is the main depository centre for all published or produced materials in the country. Public libraries are also not left out but are sometimes linked with the national libraries to access materials deposited.

5. Loans and Exchanges

Borrowing is also a means through which libraries acquire materials on temporary basis but not so common. This is done through exchange of excess copies of materials with materials dearly needed and available in sister libraries based on spelled out agreements that are expected to be complied by the participatory libraries. This can even be internationally carried out based on concrete agreements through library networkings.

6. Internal Production/Generation

Certain media are generated or produced in the library. Majority of these are metadata such as multimedia bibliographies. This is to facilities the use of library resources. Libraries can also engage producers of multimedia within their reach to produce specific media for their patroons so as to fit the use of patroons and meet their specific needs.

This method is a silent means through which libraries build collections. Librarians especially of tertiary institution libraries supposed to participate and encourage local media packaging to meet specific needs of the users. In Nigeria, studies have revealed shortage of suitable media for specific needs and domination of foreign media produced not for specific needs.

At the resources acquisition exercise point, having used any of the methods above to acquire materials, materials acquired when received are thoroughly checked using prior selection criteria.

2.4. Library Software And Software Selection Exercise

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HighLights:

« **Library Softwares**

« **Library Software Selection**

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2.4.1 Library Software

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HighLights:

« CDS/ISIS
« Alice for Windows
« NewGenlib
« Troodon
« Gyanodaya
« SOUL
« LSEase
« Libsuite asp+
« Nettib/vidyut
« GREENSTONE
« KOHA
« GLAS
« X-LIB
« TINLIB
« TINMAN,
« SLAM

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Library software selection is an exercise like normal selection of materials in the libraries but with peculiarity of been dealing with electronic system. So many criteria observed for print materials may not play part in the selection of library software. There are varieties of library softwares designed by individuals, institutions, organisations and companies to facilitate library automation. For effective performance of tasks in the library quite a number of libraries have written their own softwares, good examples of these are;

i. Compterised Documentation Services/Integrated Set of Information System (CDS/ISIS): CDS/ISIS is a computer based bibliographic software package developed by UNESCO (United Nation Education, Science and Cultural Organisation) that is used in managing library databases free of cost. CDS/ISIS is popularly used in libraries of developing countries such as Nigeria for it free of cost. This software package efficiently works on a simple PC/XT, UNIX and NOVELL platforms. The windows version also in circulation. CDS/ISIS is a suitable software for fresh libraries who to begin automation because it involves less capital investment on both hard and software components.

ii. Alice for Windows: Alice for Windows is popular library automation management software used by the libraries home and abroad. It has a complete range of library functions using discrete modules that are compatible with IBM and Macintosh computers.

iii. NewGenlib: NewGenlib is a web-based library automation and information retrieval software package that is singly integrated for efficient data storage, processing and searching. Its functional modules include but not limited to acquisition, cataloguing, circulation, serial control and online access (OPAC) etc.

vi.Troodon: Troodon is another multi-user library automation software package designed for effectively manages of library resources and operations and can be customised for local needs. Troodon has functional modules that include; acquisition, circulation, serial control, maintenance, backup, setup, and online access-OPAC.

This a beautiful library software package with modules that include; acquisition, accession, circulation, personal and uer-member management, collection management, cataloguing, article indexing, serial control, CAS & SDI services, Bar Coding, LAN/WAN and Internet support, etc.

vi. Gyanodaya: Gyanodaya is automated library management software solely developed by National Institute of Financial Management - a subsidiary of lndia government ministry of fiancé. The software is today used by some libraries particularly in India.

vii. SOUL: SOUL is a library program created by the Information and Library Network Center of the University of Georgia using a client-server architecture that strengthens storage capacity, allows multiple users to access a single database, offers different levels of security, and provides backup and storage options, among other features. Acquisition, cataloging, circulation, serial control, online access (OPAC), and administration are among its functional aspects. When linked to the network, SOUL's built-in network functionality enables numerous libraries of the same system to operate together and access databases of sharing libraries in various locations.

viii. LSEase: This integrated library management system handles a number of library functions, including acquisition, cataloging, circulation, serials control, and OPAC. Additionally, it contains features like the ability to create user ID cards, built-in barcode printing, network downloading, union cataloguing, and library maps. Additionally, LSEase offers a hybrid design and features that effectively meet the automation requirements of various libraries.

ix. Libsuite asp+: This is a web based automated library software with unique features of web centric architecture. These features are; a. non dependency on single client (I.e. no client needs to be loaded, for any system with internet connectivity can be a client), b. works independent of client O/S on Linux client, and c. easy disaster recovery and back procedure. Its functional modules are; acquisition, cataloguing, circulation, serials control, house-keeping, queries, and set-up.

x. Nettib/vidyut: This is a versatile developed library automation system with popular features essential for modern automated libraries. These features include normal librarary functions such as; administration, acquisition, cataloguing, circulation, serials control, online access (OPAC), article indexing, and membership registration etc.

Different application software packages are made accessible to enable automation exercises at the library, too many to list here. Some of the application packages that are now on the market and specifically created to perform library operations are GREENSTONE, KOHA, GLAS, X-LIB, TINLIB, TINMAN, SLAM, and others that will not be included here. The decision between any of these is influenced by the software's effectiveness and the library's necessity.

2.4.2. Library Software Selection

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HighLights:

« **Criteria for Selecting Library Software**
« **Participants in Library Software Selection**
« **Library Software Selection Aids**
« **Procedures for Selecting Library Software**

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As earlier mentioned, there are varieties of library softwares designed by individuals, various institutions/organisations and companies to facilitate management of library automation. Some shere the same features while some varied with others for minus or addition of a particular feature. Thus, library software selection is an exercise that needs to be carefully done taking into consideration general and specific features in the software designed for library use.

2.4.3. Criteria For Selecting Library Software

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HighLights:

« **Authenticity of the product**
« **Reputation of developers**
« **Comprehensiveness of the product**
« **Number of times revised**
« **Availabity of facility to import/export bibliographic data**
« **Number of parameters available for the module**
« **Availability on major operating systems**
« **Ability of interface with web**
« **Ability to interface with institutional e-mail system**
« **Ability to offer Oline-Public-Access-Catalogue services**
« **Popularity in the area**
« **Provision of coaching and guidance during and after instalment**
« **Flexibility of use**
« **Cost of installation vis-a-vis financial capability of the library**

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Taking into consideration few criteria elucidated below may help library managers to select the suitable software for their libraries:

i. Authenticity of the product: be sure the software to be selected is from the right developer and deal with the developer or authenticated agent

ii. The reputation of developers: think of popular developers that have made good name in the business.

iii. Comprehensiveness of the product: make sure the software contains all the needful modules to serve the purposes of the library.

iv. Number of times revised: consider number of times the software has been revised since it existence.

v. Availabity of facility to import/export bibliographic data: check if the software possess ability to import and export bibliographic data in IS02709 format.

vi. Number of parameters available for the module: check the number of parameters the software has for each module; he more the number of parameters the better the flexibility of the use.

vii. Availability on major operating systems; check if there available on major operating systems to facilitate use.

viii. Ability of interface with web; check if the software is web interface.

ix. Ability to interface with institutional e-mail system: check if the software can be interfaced with e-mail system of institutional network or can not.

x. Ability to offer Oline-Public-Access-Catalogue services: check if the software has ability to offer OPAC services and other chances to logins or not.

xi. Popularity in the area: consider number of installations made so far in your area or country and since when, as well as the major clients within the area.

xii. Provision of coaching and guidance during and after instalment: make sure there is provision for training and proper guidance of library personal during and after installation, and should be part of installation requisite.

xiii. Flexibility of use: make sure is software simple to be use and free of naughty

xiv. Cost of installation vis-a-vis financial capability of the library: Although efficiency of the software should not be override for cheapness but it is also important to considers the cost of installing particular software as to the financial capability of the library. Where two or more softwares are equally effective and can suit the need of the library then cost should be determinant of software to go for. In this case, the less the cost the more money saves for other businesses.

2.4.4 Participants in Library Software Selection

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HighLights:

« **Librarians**

« **Technologists**

« **Organization Management**

« **Users (staff, students, other patrons)**

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Library software selection exercise should not be done by librarians alone. Librarians should interact with computer professionals and relevant stakeholders (such as organization manament, staff and student users, other patrons etc) in deciding particular software to be selected for the library. This would go a long way in actualising the very objectives of library automation.

2.4.5 Library Software Selection Aids

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HighLights:

« **Software developers' release**

« **IT briefs**

« **The Internet**

« **Sample libraries**

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Various sources can be contacted in selecting library software. The sources are platforms containing information on softwares produced and ready for use. Some of these platforms are properties of the developers or mediators making advertisement for the companies in software business. Some of these platforms are:

1. Software developers' release: a check on release on latest products by developers serves good source for indentifying software in existence and attributes of the software.

2. IT briefs: Information Technology briefs, newsletters and magazines are also good sources of identifying latest technologies. These can be consulted when selecting library software.

3. The Internet: The internet, particularly the websites of software developers/marketers are good sources for catching up with latest developments in software. A look at this will facilitate library software selection process.

4. Sample libraries: These are libraries with track records in automation either home or abroad. These libraries are good sources to understand attributes of different library software and the successful software installed and that is efficiently serving the needs of the library; it said 'experience is the best teacher'. Sample libraries can be consulted to

arrive at particular software to be used in the library that beginning automation exercise for the first time.

2.4.6 Procedure For Selecting Library Software

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HighLights:

« **Preminary study of institution/users the library serves**

« **Visibility study of sample libraries**

« **Selection exercise**

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Software selection is a set of procedure that should be carefully followed in order to make a good selection of software that would meet up the zeal for chosen it. The set of procedure involve;

1. Preminary study of institution/users the library serves: A study to understand objectives, activities, and aspirations of the institution and users the library is meant to serve is a step to understand a software that suit the library and put it on the track that meet users' needs. Details collected in this study guide the decision of librarians in arriving at a good selection of software for the library.

2. Visibility study of sample libraries: Sample libraries are libraries already far in the activities of automation and with good record of automation. Some libraries have long ago automated their activities and services provided to the users and are doing well in this direction. These libraries are expected to have quite experience in automation and can guide other intending libraries on automation. They can be consulted to determine software to be selected for the library.

3. Selection exercise: This is the real effort in making a decision to pick suitable software for the library. This effort requires careful consideration of selection criteria and findings of preminary/visibility study. In doing this, opinions/inputs of stakeholders in selection exercise be duly considered in order to arrive at a good decision. Once a decision is made, share this again with colleagues elsewhere so as avoid taken wrong decision and finally invite the chosen software company to forward the bill for consideration by library and management board. When the approval is obtained, the company can be invited to make installation of the software.

2.5. Cryptocurrency And Collection Development Exercise

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technology of cryptocurrency and the prospects of it in collection developme exercises most especially in Nigeria libraries. However, to understand ho cryptocurrencies work, the meaning of some basic terminologies attach to it we

clarified, types, values ar functions of cryptocurrencies also highlighted. Also reviewed is the emerging econon of cryptocurrencies in various nations and features that would help drive cryptocurren

HighLights:

« **The Concept of Cryptocurrecy**

« **Terminologies: Blockchain, Addressess, Minnig & Miners, Wallet & Wallet ID, Public Key & Private Key.**

« **Types of Cryptocurrenciess**

« **Values and Functions of Cryptocurrencies**

« **The Nations and Emerging Economy of Cryptocurrencies**

« **The Future of Cryptocurrency Usage in Collection Development in Nigeria Libraries.**

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Inside the discussions below, attempt made to explain the concept of computing technology of cryptocurrency and the prospects of it in collection development exercises most especially in Nigeria libraries. However, to understand how cryptocurrencies work, the meaning of some basic terminologies attach to it were clarified, types, values and functions of cryptocurrencies also highlighted. Also reviewed is the emerging economy of cryptocurrencies in various nations and features that would help drive cryptocurrency usage in library acquisition transactions in collection development. In conclusion, organising of workshops and trainings to enlighten and equipped library managers on the use of cryptomoney, methodical planning from the part of the government, libraries and collection development librarians deem fit to avail the opportunities of using cryptocurrencies.

Barely a year now, precisely monday 25th October, 2021 president Muhammad Buhari lunched the Central Bank of Nigeria Digital Currency (CBNDC) known as electronic Naira (e-Naira) issued by Central Bank of Nigeria (CBN) as a legal tender. This an attempt to make Nigeria join the rest of the world in crypto-monetary system,

and this was adjudged by many financial and economic analysts as a right step in the right direction.

Certainly, change in life doesn't come to one, it is one that seek for it and tap the values brought by it. As life is gradually redefined by digital age one found himself, to keep with life certainly there is no choice than to go for it as it is redefined. Virtually everything about life is technological incline. Whether by evolutionary or revolutionary means, the world will certainly continue to experience novelty, discoveries and inventions that shape life, and for sure in a world where digital technologies such like robotics, artificial intelligence and digital machines increasingly assert relevance, it is not surprising that 'money' the very orbit around which the global economy revolves is also going digital (Okeke, 2021). Welcome to the new world of monetary system, the new world of financial inclusion, the world of cryptocurrencies, where the term 'legal tender' has taken a different meaning – all digital, unregulated, and uncensored.

Cryptocurrency is an emerging opportunity in monetary system that is redefining the life in business transaction and overall financial inclusion. Cryptocurrency, through its mathematically complex encoding and decoding protocol, has made it possible for huge amount of virtual currencies to be transferred over decentralised public networks, unintercepted and uncorrupted. A situation that for some decades past, computer scientists might think was impossible. In fact, this is even beyond human imagination for some decades past. This situation is gradually becoming a reality and of course redefining mode of world transactions and for sure would also redefine the mode of collection development in the library particularly with regard to library resources acquisition through purchasing method.

The process of developing an usable and balanced collection of library items over a number of years is known as collection development exercise. It is based on a continuing evaluation of the information requirements of library users, analysis of usage data, and demographic forecasts. Budget constraints can occasionally prevent this. The creation of selection criteria, planning for resource purchase and sharing, replacement of lost and damaged objects, as well as routine selection and deselection choices, are all included in the collection development effort (Reitz, 2004). Selection, purchase, and culling of resources are all part of collection development (i.e. deselection of damage, obsolete, or excess copies of materials from the existing library stock to create space for new arrivals).

Methods used in the library to acquire library materials otherwise known as 'acquisition methods' are many, good examples of these methods are; purchasing, donation/gift, bequeath, legal-deposit, and internal material production. Out of these methods, purchasing method where money budgeted for the library used to buy materials for the library is one of the exercises manned by collection development unit of every library. The major acquisition transaction that takes place in Nigeria libraries is purchasing of library materials (journals, books, dailies, etc, hard and soft copies. Nigeria is the most populous black nation located in west-Africa sub-region with a population of

over two hundred million people, and quite a lot of libraries in states, local government areas and institutions across the country. Obviously in Nigerian libraries, money either cash or check is what is majorly used to acquire library materials. Purchasing is an annual event in most cases but in some cases daily like purchasing of dailies (newspapers, magazines, etc.)

Purchases in nearest future would be fully done using crptocurrencies even in developing countries including Nigeria. On this ground it necessary for librarians, especially acquisition librarians to start preparing their minds and grounds for library transaction using cryptocurrencies as the world economy is gradually driving towards that. Doing so, the need to beam light on the term 'Cryptocurrency' as it relates to library transaction (resources acquisition) is important. What then is 'Cryptocurrency'?

Cryptocurrency is a virtual currency that is developed through mathematical encoding and decoding of computer protocol which has made it possible for huge amount of virtual currencies to be transferred over decentralized public networks, unintercepted and uncorrupted. In simple terms, cryptocurrency is computer-generated money that can be used to pay for transactions just like conventional money. It is also considered an exchange commodity, like gold, silver or olden days cowries. It is therefore an investment instrument, just as you have stocks and shares that are traded in capital markets. Today, investors buy and store cryptocurrency with hope that it will increase in value over time and give them a good return on their investment. According to Sampson (2017) the term 'cryptocurrency' is derived from the key security feature of these; 'cryptography' and 'currency'. Cryptography is a mathematical coding and decoding mechanism invented during World War II as warring parties tried to secure their communication and avert interception of their messages by enemies. With the emergence of the digital age, computer and software experts have built on this technology, using a combination of complex mathematical theories and software codes to mine digital coins while also securing transactions on them. In this system, through a two-way authentication process, senders and receivers of cryptocurrencies are able to encrypt and decrypt transaction messages across a secure, public network, and also control the creation of additional units of currencies in a simple way.

Several nations, especially in North America and Europe, are reviewing their financial policies and regulation to accommodate virtual currency. Thus, efforts are being made by policy makers in these nations to clearly understand the nature and functions of cryptocurrencies with the aim of leveraging its benefits. In this regard many definitions were attached to the term cryptocurrency (virtual money) by deferent bodies

According to the Internal Revenue Service's (I.R.S.) definition from 2017, it is a digital representation of value that can be used as a store of value, a unit of account, or a medium of exchange but is not recognized as legal money in any country. Similar to this, the European Banking Authority (EBA) defines it as "a digital representation of value that is accepted by natural or legal persons as a means of payment and can be transferred, stored, or traded electronically, but is not necessarily attached to a fiat currency or issued

by a central bank or a public authority." These organizations are already developing strategies for collecting taxes from bitcoin transactions.

To understand how cryptocurrencies work, it is necessary to know the meaning of some of the basic terminologies attach to it and these are:

i. Blockchain: This is a public ledger that keeps track of all cryptocurrency transactions made. This is a global online database that one with an internet connection can use but belongs to no one. Blockchain is a growing collection of data known as "blocks" that are connected and safeguarded using encryption.

ii. Addresses: These are string of symbols (sequence of letters and numbers generated randomly) that are used to send cryptocurrencies.

iii. Mining and Miners: Mining is a record keeping service of blockchain while miners are keepers of blockchain.

iv. Wallet and wallet ID: A wallet is an electronic purse where inflows are stored and from where outflows are sent while wallet ID is person's password (string of random letters and numbers) that acts as username used to log into the wallet.

v. Public key and private key: Public and private keys are both sequences of letters and numbers through which funds are received in the transaction of cryptocurrency, but while public key is the account address through which funds are received in the transaction of cryptocurrency and of which is disclose to the payers expecting inflow from, private key on the other hand is the holder's signature that acts as proof of ownership which is kept secret. Private Key is used by the account holder to authenticate inputs and outputs in the transaction of cryptocurrency.

2.5.1. Types Of Cryptocurrencies

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HighLights:

Bitcoin
Etherum
Ripple
Lota
Litecoin
Ripple
Lota
Novacoin
Peercoin
Namecoin
NairaEx
Geopay
Ekasi-Blucks
Bithub-Africa

BitMari
PayPlux
Belfrics-Global
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Today more than nine thousand different cryptocurrencies are in circulation around the world with Bitcoin, Etherum, Ripple, Lota and Litecoin being the most popular. Among these currencies, Bitcoin is the oldest and most widely known with $57.2 billion in circulation as at June 2017. Bitcoin was developed in 2009 by the anonymous Satoshi Nakamoto, whose identity is yet known in the cryptocurrency industry. It is estimated that between 10 and 15 million people around the world currently hold material amount of Bitcoin (Wikipedia, 2019). The market capitalization of Bitcoin is now about $66.6 billion, at a unit price of $54116 and there is speculation by industry analysts that Bitcoin's price would rise above $11,000 by 2022.

The next to Bitcoin in popularity is Ether, which is said run on the Ethereum blockchain. Initiated in July 2015 by a 21-year-old Russian-Canadian and ex-Bitcoin programmer, Vitalik Buterin, this cryptocurrency currently has total value of about $28.1 billion in circulation. It market capitalization is $30.3 billion, while unit price is above $300 (Wikipedia, 2019). Ether has gained much traction in recent months following its endorsement by major US brands, including Deloitte, Microsoft, JPMorgan, Accenture, and Intel. It is estimated that around 2 million people currently hold material amount of Ether across the world (Sampson, 2017).

Moreover, other fast emerging cryptocurrencies in circulation includes; Ripple; founded in 2012 and with market capitalization of around $6.3 billion. Litecoin; released in 2011 by Charlie Lee, a former Goggle employee, with total market value of around $2.4 billion and unit value of about $46.00. And Lota; founded in 2015 by David SØnstebØ, with $2.8 billion worth currency in circulation, $2.4 billion in market value, and unit price of about $1.00 (Wikipedia, 2019). Others to mention but few are novacoin, peercoin, namecoin, and so on, are some of the cryptocurrencies that are fast emerging.

Several nations, especially in Asia and Europe have reviewed their financial policies and regulation to accommodate virtual currency. Also in Africa, several cryptocurrency exchanges and merchants are springing up. Some emerging African players in this space include Geopay and Ekasi-Blucks from South Africa; Bithub-Africa from Keyan; NairaEx from Nigeria; BitMari from Zimbabwe; PayPlux from Gana; and the rest. A Malaysian bitcoin trading platform called Belfrics-Global has revealed ambitions to launch exchanges all across Africa in order to promote financial inclusion and hasten the spread of virtual currency on the continent.

2.5.2. Values And Functions of Cryptocurrencies

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HighLights:

« Facilitates market trade

« Switching barriers between investments & investors

« Facilitates collaboration and competiveness in trade & excellent service delivery

« Exist as records of transactions (the legder)

« Has scientific value that solve the riddle referred to as the Two Generals' Problem (or the Byzantine General' Problem) in computing, through its mathematically complex encoding and decoding protocol

« Impervious to censorship and cannot be shut down

« Value usage of a decentralized public ledger which eliminates third party before transactions completed

« Speed in mining and transaction

« Secure storage

« Independence from sovereign authorities and inflationary pressures

« Low transaction costs

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Cryptocurrency has brought enormous value to global transaction and economy. It facilitates market trade and switching barriers between investments and investors. Cryptocurrency ultimately facilitates collaboration and competiveness in the market and excellent service delivery. Cryptocurrencies have no real value as you have in commodity monies such as gold, or as you have in paper or fiat money such as the Nigerian naira or US dollar. Rather, the value of a cryptocurrency is derived from the perception of the value that investors, users and speculators place on it. Also, cryptocurrencies have no physical existence. They exist only as records of transactions and not as physical currencies, like we have naira, dollars, euro, or pound sterling (Economic digest, 2019). Thus, person possess Bitcoin do not necessarily have any physical Bitcoin in one place or account. When you purchase a Bitcoin, what you actually get is not a tangible item, but record of transaction indicating the value of what you purchased, and the same applies when you receive inflows of cryptocurrency. ln an article published in Forbes.com titled 'The Value of Cryptocurrency Today and What the Future Might Hold', Chalmer (2015) posits that the value of Bitcoins can be determined in different ways. And that, one of such way is their scientific value that has been able to solve the riddle commonly referred to as the Two Generals' Problem (or the Byzantine General' Problem) in computing which demonstrates the complex challenge of coordinating an action by communicating over an unreliable, untrusted link. Cryptocurrency, through its mathematically complex encoding and decoding protocol has made it possible. Leandro

et'al (2013) claims that cryptocurrencies like Bitcoin have technological worth in addition to their scientific value since they are impervious to censorship and cannot be shut down. They said that the usage of a decentralized public ledger, which eliminates the requirement for a reliable third party before transactions can be completed, gives them social value. In addition to these, analysts have made the case that the many benefits derivable from cryptocurrencies, include; speed of new coin mining and transaction, secure storage, independence from sovereign authorities and inflationary pressures, low transaction costs, and their innovative infrastructure and features, all these add to their market value.

2.5.3 The Nations And Emerging Economy Of Cryptocurrencies

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HighLights:

« **Europe and America where the virtual currency technology evolved have demonstrated significant acceptance of the new money, even though skepticisms persist.**

« **In Asia, countries like China and Japan have embraced cryptocurrencies even more than in Europe and America.**

« **China may well be the place where more than half of all global cryptocurrency transactions would take place.**

« **. Japan closely follows China in swift usage of cryptocurrency. It is reported that Japan actually displaced the United States in the middle of January 2017, to take the second spot after China.**

« **In volume of Bitcoins transactions In Africa, South Africa has taken the lead in the adoption of cryptocurrencies with hundreds of merchants already accepting cryptos in that jurisdiction.**

« **Mauritius could also be considered as gearing up to play actively in the cryptocurrency space. This country is partnering with a US startup, ConsenSys, to create a blockchain technology hub called the Ethereum Island.**

« **Egypt is another nation championing the usage of cryptocurrency. The first local Bitcoin exchange 'BitcoinEgypt is launched in this country.**

« **On Monday 25th October, 2021, the Central Bank of Nigeria unveiled Digital Currency known as e-Naira.**

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Quite a lot of nations are taking steps towards imbedding the technology of cryptocurrency. The advanced economies of Europe and America where the virtual currency technology evolved have demonstrated significant acceptance of the new money, even though skepticisms persist.

Beyond Europe and America, other part of the world are also keying to the technology of cryptocurrency. In Asia, countries like China and Japan have embraced

cryptocurrencies even more than in Europe and America. It is anticipated that China may well be the place where more than half of all global cryptocurrency transactions would take place very soon (Wikipedia, 2019). And that some of the factors that may drive cryptocurrency popularity in China would include the need to break away from the highly government controlled socialist system, the zero transaction fee, the very high return on investment and swift technological transfer among the citizenries. Japan closely follows China in swift usage of cryptocurrency. It is reported that Japan actually displaced the United States in the middle of January 2017, to take the second spot after China in volume of Bitcoins transactions (Sampson, 2017). In Africa, South Africa has taken the lead in the adoption of cryptocurrencies with hundreds of merchants already accepting cryptos in that jurisdiction. The Reserve Bank of South Africa has expressed willingness to explore opportunities in cryptocurrencies, including the possibility of issuing its own virtual money. If a report published in bitcoinafrica.io is anything to go by, Mauritius could also be considered as gearing up to play actively in the cryptocurrency space. This country is partnering with a US startup, ConsenSys, to create a blockchain technology hub called the Ethereum Island. Mauritius plans to create an ecosystem of blockchain innovators and entrepreneurs; establish itself as a key player in blockchain technology, and pursue its vision of becoming a financial gateway to African and Asian markets (Wikipedia, 2021).

Egypt is another nation championing the usage of cryptocurrency. The first local Bitcoin exchange 'BitcoinEgypt is launched in this country. According to the report published on Bitcoinafrica.io this would enable trade on Bitcoin and other cryptocurrencies using the Egyptian pound, thereby connecting the local economy to the global digital currency market.

In other parts of Africa, quite a number of cryptocurrency exchanges and merchants are springing up. In Kenya, Ghana, Nigeria and many others, efforts are on top gear accommodating the technology of cryptocurrency. This could be deduced from the effort put in place by these nations in developing their own type of cryptocurrencies as brought up in types of cryptocurrencies section above. Just of recent, Central Bank of Nigeria (CBN) – the apex bank of Nigeria, motioned that the pilot stage of the digital currency is expected to kickstart by October, 2021 though financial technology specialists said the date may not be feasible even as they warn the apex bank to be cautious, think of methodical planning and consult widely (Akwaja, 2021). Against this speculation, president Muhammad Buhari on Monday 25th October, 2021 unveiled the Central Bank of Nigeria Digital Currency (CBNDC) known as electronic Naira (e-Naira) issued by Central Bank of Nigeria (CBN) as a legal tender (Daily Trust, 2021). This development by CBN justifies the need to x-ray the future of cryptocurrency usage in collection development in Nigeria libraries.

2.5.4 The Future of Cryptocurrency Usage in Collection Development in Nigeria Libraries

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HighLights:

« Usage of crptocurrencies for purchases in Nigeria libraries will come to stand for the factors and values identified below:

« The growing penetration of ICT infrastructure and mobile telephony could help drive cryptocurrency adoption in library acquisition transactions.

« One of the biggest attraction for cryptocurrency usage and is expected to pool librarians is the convenient transaction cost especially with agencies abroad.

« Virtual currency transactions could be free of charges, and even when fees are involved, it could be determined.

« Another powerful drive to cryptocurrency usage is its fastness and safety compared to cash or cheque.

« More so, bureaucratic impediments foreseen in conventional banking transactions are totally absent because digital monies are decentralised, not control by individual government.

« No third party in the business that has control over accounts of two parties making business.

« Libraries can hold as many wallets as possible at the same time to enhance purchasing transactions.

« No chargebacks once a transaction is completed, which is quite different from what is obtainable in credit cards.

« The security of users' payment information in cryptocurrency transaction is guaranteed, unlike credit card transaction where information could be intercepted and stolen.

« The limitation of purchasing-order in the value chain in conventional fiat money transactions by banks and regulatory bodies does not hold with cryptocurrencies because the technology is decentralized.

« Unlike traditional fiat money, cryptocurrencies are not subject to inflationary pressure occasioned by monetary regulators' policies.

« Cryptocurrencies per say, would offers a major opportunity for financial inclusion of libraries in Nigeria, and open doors for collaborations.

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The usage of cryptocurrencies in collection development particularly with regard to acquisition of materials through purchasing method either in Nigeria libraries or elsewhere will come to stand. The growing penetration of ICT infrastructure and mobile telephony could help drive cryptocurrency adoption in library acquisition transactions. So far however, since the lunch of eNaira, much enthusiasm has been seen

by librarians in Nigeria where a transaction using computing technology of cryptocurrency is a welcome idea. This was view of many librarians the idea shared with during 2021' Librarians Registration Council of Nigeria (LRCN) conference. Nevertheless, several librarians especially those working in government owned libraries are still highly skeptical and cautious of cryptocurrencies. owing to perceived risks from an unregulated and complex blockchain technology market, as well as apprehension that virtual currency, with its highly decentralized structures, could be used to carry out illicit transactions.

However, cryptocurrencies are gradually evolving into popular medium of exchange in many parts of the world. One of the biggest attraction for cryptocurrency usage and is expected to pool librarians especialy collection development librarians soon is the convenient transaction cost especially with agencies abroad. Unlike conventional banking transactions that always attract charges, virtual currency transactions could be free of charges. And even when fees are involved, how much to pay could be determined (Chalmers, 2015). Another powerful drive to cryptocurrency usage is its fastness and safety compared to cash or cheque transactions practice by most libraries in Nigeria. Cryptocurrency transfers are faster than regular international wire transfers. Zero-confirmation transactions are instant, while transactions that require confirmation take an average of 10 minutes to complete, way faster than the time lapse for international wire transfers (Sampson, 2017). Beside this, cryptocurrencies are not subject to the control of government of any nation or regulatory banks, they are completely decentralized. So, the issues of bureaucratic impediments foreseen in conventional banking transactions are totally absent, making it faster. Okeke (2021) stressed that the most amazing advantage in cryptocurrency transactions is that no third party in the business that has control over accounts of two parties making business; the buyer and seller. What it means is that, unlike in conventional bank transactions, individual account cannot be frozen by any one owing to inactivity, dormancy, misuse or overuse, etc, without releasing the private and public keys necessary to do so. This makes the account owners wealth in all sense and a key to facilitating transactions in the libraries.

Moreover, cryptocurrency users can have as many wallets as they want. In fact, unlike in conventional bank account holding where multiple accounts owned by single customer may generate suspicion, having many wallets at the same time is a norm in cryptocurrency business, since this enhances transaction security. Similarly, libraries can hold as many wallets as possible at the same time to enhance purchasing. Relatedly, in the transaction of cryptocurrencies there also no chargebacks once a transaction is completed, because it cannot be reversed without the consent of the recipient. This is quite different from what is obtainable in credit cards when card holders could fraudulently request for chargebacks after a legitimate transaction has been completed which sometimes a case in library transactions. Relatively, the security of users' payment information in cryptocurrency transaction is guaranteed. Unlike credit card transaction where information could be intercepted and stolen during online transaction,

cryptocurrency transaction is secured from such identity and users' information theft. This is due to the very secure encryption and decryption technology, and the mathematically complex public and private keys combinations on which virtual currency transactions run. In this technology of cryptocurrency, identity theft is almost impossible since users ID are confidential. Lutus (2020) stressed that users are not required by cryptocurrency transactions to disclose their confidential information before making transaction which is impossible with the use of conventional ATM and credit cards. When users make a purchase with ATM card or credit card, users' personal information such as name, physical address, etc, is attached to every transaction. But with cryptocurrency transaction, the user is completely anonymous. While the blockchain that carries the different addresses or account ID are transparent and publicly available, it is however impossible to identify owners of addresses, funds and transactions of cryptocurrency; inflows and outflows are publicly seen, but no one can tell the owners of them.

It is also interesting to note that the limitation of purchasing-order in the value chain in conventional fiat money transactions by banks and regulatory bodies does not hold with cryptocurrencies because the technology is decentralized and own/control by no single body. More so, unlike traditional fiat money, cryptocurrencies are not subject to inflationary pressure occasioned by monetary regulators' policies. For instance, government authorities could decide to print more currencies of their will to increase their purchasing power or to meet their financial obligations, thereby resulting into inevitable inflation and high cost of materials, including library materials. But with cryptocurrencies, this is totally ruled out because of its decentralized nature that absolutely takes it out of government control. Overwhelmingly, all these benefits and with increasing acceptance of virtual currencies in the global corporate community is an indication that indeed cryptocurrencies could go complete mainstream and be popularly accepted as legitimate means of exchange, and could also have a future in collection development in not just Nigeria libraries but libraries elsewhere.

Inded, virtual currencies are gradually becoming a veritable frontier through which users are allowed to conduct a range of financial transactions remotely using mobile devices. This overwhelming success of computing technology would revolutionalised the financial services industry and pool wide range of advantages that enables users to overcome many of the constraints that exclude them from the financial system. Cryptocurrencies per say, would offers a major opportunity for financial inclusion of libraries in Nigeria, and open doors for collaborations and seeking aid with partners across the world. What is now required is methodical planning from the part of the government, libraries and collection development librarians to avail the opportunities brought, and more to be brought by computing technology of cryptocurrency.

2.6 Electronics Grey Literature Resources Collection and Packaging: Strategies for Libraries in Nigeria

***HighLights*:**

This is a shered opinions of librarians on strategies for improving electronic grey literature resources collection in libraries of colleges of education in Nigeria with the hope of preparing them better for usage, encourage and foster the use of e-grey literature resources both local and foreign, and also to augment the scarce book materials in these institutions. Survey research design was employed with questionnaire as instrument for seeking opinions of librarians. The opinion seeking covers three colleges of education in North-Central States. The undertaken revealed the types of grey literature resources to be collected, elements to be considered, ways through which they should be collected and packaged for better usage. As part of the recommendations, the attention of the management of these institutions is drawn on focusing on collection and packaging of electronic grey literature resources by providing all it required so as to enjoy huge benefits tied these important resources. The details of undertaken is below.

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2.6.1 Introduction

Electronic grey literature usage is gaining popularity within elites and learned society in Nigeria and the world at large. Grey literature is evolving as a result of electronic communication, and this includes e-mails, faxes, blog posts, wikis, and podcasts (HLwiki, 2012). Grey literature is now more widely accessible online, in most cases, in forms of Adobe Acrobat (PDF documents). This is an indication that contemporary electrnic grey literature may be easily located with a straightforward Google search. Institutional repositories on the internet that are being developed by universities worldwide are a significant source of grey literature. The majorities of international institutional repositories compile academic work produced at their institutions and make them available online (Muhammad, 2013).

The need for libraries in Nigeria to look for different avenues for acquiring resources other than the popular purchasing method is apt. If this is considered apt, the need to improve collection and utilisation of the very important and original sources of information in the libraries and information businesses - the grey literature is also apt. Appreciable number of grey literature resources today exist in both formats; print and electronic formats. Obviously, electronic formats (electronic grey literature resources) are largely and freely available online.

An overview of the concept of grey literature in broader perspective entails that grey literature is recorded material that is available in a variety of mediums and formats but is

produced in an unorthodox (unconventional or semi-conventional) manner and frequently isn't formally classified, priced, or accessible through traditional bookselling channels. According to Hirtle (1991), the categories of grey literature resources include quasi-printed reports, unpublished but distributed papers, unpublished conference proceedings, printed conference programs, and other non-unique materials that appear to make up the majority of our contemporary manuscript collections. Grey literature resources cover a wide range of documents that contain valuable information and are produced by human endeavors, including: pre- and post-prints of articles, conference proceedings, seminar/workshop papers, research reports, projects, theses, dissertations, syllabus, lecture plans/notes, speeches, addresses, research reports., sermons, technical papers, working papers, blueprints, white papers, MOUs, banks/marketing reports, manuscripts, maps, surveys, recipes, diaries, calendars, chronicles, etc, in print and electronic formats.

The majority of those who write grey literature defined it as a way of explaining complicated subjects to laypeople in order to raise awareness and support for a certain cause. Grey literature has a significant influence on learning, teaching, and research. Researchers consult grey literature to get data to support their study as well as to inform the audience of the findings. It is sought for by both teachers and students to promote instruction and learning. Certainly, grey literature resources since existence of humans have been extensively used to support many educational programmes, from when clay tablets were used for writing to papyrus and parchments, and now papers and electronics. No educational programme, no matter the level of driving force of skilled personnel with which it may be equipped ever comes to life without suitable material resources. Grey literature resources are first and common material resources in any educational programme because it is the podium for most write-ups - the manuscripts. Even the scripts of assignments, test, examinations, lesson-plans and notes form part of grey literature resources that cannot be disconnected from any educational programme.

2.6.2 Statement of the problem

As earlier stated, the first and common material resources that comes to most minds when talking education are books containing right and suitable ideas. In Nigeria colleges of education, studies such as Obayomi (2015), Enagi and Bida (2016) and Peterson (2019), have revealed shortage of suitable book materials thereby making library users grumbling any time they go to such libraries to establish their needs. Regrettably, the abundance prints grey literature resources in these institutions and available free electronic resources most especially researches, seminars, workshops and conference papers in many depositories (local and international) and which if properly collected and packaged are worthy of augmenting book materials but abandoned in the hands of the producers or from the point of production. The study was therefore conceived to establish, through the perceptions of librarians of the colleges of education, strategies for

improving grey literature resources collection, particularly the electronic grey literature resources.

2.6.3 Purpose of the study

The purpose of the study was to establish, through the perceptions of librarians of the colleges of education, strategies for improving grey literature collection, particularly electronic formats, with the hope of packaging them in better form for usage and to augment the scarce book materials in the institutions.

2.6.4 Reseach Questions

The following questions guided the study:

1. What type of grey literature resources should be collected and packaged by colleges of education libraries in Nigeria?
2. What elements should be considered for the collection and packaging of grey literature resources by colleges of education libraries in Nigeria?
3. What ways the grey literature resources are to be collected by colleges of education libraries in Nigeria?
4. What ways the grey literature resources are to be packaged by colleges of education libraries in Nigeria?

2.6.5 Significance of the study

Findings of the study would provide libraries and institutions home and abroad, particularly libraries of Nigeria colleges of education with valid and reliable information on how to improve the collection of grey literature resources so as to ensure efficiency and effectiveness in it usage.

2.6.6 Review of Related Literature

The term "grey literature" was first used by pioneering scholars like Chilag and Wood in 1982 and 1984 to refer to all types of unconventionally published works. While it is not technically classified or priced, Auger (1989) views it as semi-published literature that is still in circulation. When used as a whole, the phrase refers to a wide range of educational resources that can only be obtained directly from the source and are not often available through publishers, sales agents, or other traditional book business methods. According to Aina (2000), the third International Conference on Grey Literature (ICGL), which took place in Luxembourg in 1997, unanimously agreed to define Grey Literature as informational content generated by government, academia, business, and industry both in print and electronic media, but is not primarily focused

on publication and is not governed by commercial publishing interests. According to DeBerg and Scheib (2018), some of the traits of grey literature resources include being hard to find and lacking in systematic organization but nevertheless providing valuable research material. Here are updated features of grey literature resources based on Omeje (2010) and Enagi's theories for easy comprehension and differentiating them from other forms of literature resources (2014):

1. Resources for grey literature are published unconventionally or in a semi-conventional manner, but they are not advertised as such; they are not frequently available via traditional sources of book supply.
2. They might be challenging to locate and purchase on occasion.
3. Secondary bibliographic services like indexes, abstracts, and bibliographies often do not cover them.
4. They frequently include original data (i.e. primary sources of information).

One cannot overemphasize the value of grey literature. The value of grey literature, according to Peterson (2019), rests in its capacity to distribute findings more rapidly and to simplify difficult material. According to Mukhtar (2009), grey literature gives citizens the knowledge they need to make decisions about their lives and the societies in which they live. Whether people are going on a trip, conducting a study, buying an appliance, treating an illness, repairing machinery, participating in an archaeological dig, or engaging in any number of other activities as part of their daily lives, grey literature will continue to be a source of information that is reliable and accessible.

However, studies have revealed the high rate of abandoning of these important resources in tertiary institutions in Nigeria. Particularly that of Enagi (2014) and Enagi and Bida (2016) revealed the high rate of abandoning of grey literature resources by colleges of education libraries in Nigeria. These resources if properly collected and packaged shall indeed augment the scarce book materials in these institutions. In line with this, Aina (1994) suggested for every country in Africa should establish a National Documentation Centre for grey literature with the sole objective of collecting, organizing and disseminating grey literature. That this centre should be of the same status with the National Library. While the National library is charged with the collection, organisation and dissemination of conventional (published) literature, the former should concentrate mainly on grey literature. Unlike published materials, the task of collecting grey literature wouldn't be easy. With regards to this, Samaila and El-Kalash (2019) says that although the management of grey literature collections is an arduous task for librarians and other information professionals, this is especially so in developing countries where libraries have difficulties in acquiring traditional materials.

The task of improving grey literature collection and utilisation is a network of activities that involves acquisition, organizing, preservation and dissemination of defined information materials to potential users. Consequently, undertaken made to seek opinions of librarians on the ways the first aspect of activities (collection/acquisition of grey resources) may be accomplished. upon this, Peterson

(2019) listed out several methods of acquiring grey resources to include; legal deposits, purchase, subscriptions, online search and resource sharing through inter institution or inter library collaboration (i.e. library consortium). Though, according to him purchase and subscriptions have less to do with the collection of grey literature resources because of it peculiarity of not been sold but legal deposits, online search and resource sharing are of immense important in the collection of grey literature.

2.6.7 Methodology

Descriptive survey design was used to seek opinions of librarians from three sampled colleges of education in North-Central States. Stratified proportionate random sampling technique was employed in selecting ten respondents from each of the institutions. Thus, thirty number of librarians were engaged in the study. The instrument used for the study was a researcher developed questionnaire titled "Strategies for Improving Grey Literature Collection in Nigeria Colleges of Education Libraries Questionnaire" (SIGLCOELQ) which consisted two parts, viz; Part 'A' sought information about respondents while part 'B' was developed on a five point likert scale of Strongly Agree (SA) = 5 point, Agree (A) = 4 points, Undecided (UD) = 3 Points, Disagree (D) = 2 points, and Strongly Disagree (SD) 1 point. The questionnaire was validated by two experts in the field of library and information science from Ahmadu Bello University, Zaria. It was also pilot tested using ten librarians within Niger state. A re-determination after four weeks using same librarians showed that few of these respondents changed their responses. A test-retest reliability value of 0.74 was obtained using the Spear Man Brown prophecy formula. The copies of the questionnaire were administered by the researchers with the help of three research assistants, one from each institution. The questionnaires were all returned within the maximum period of two days. Descriptive statistics which involve the use of mean were used to answer the research questions.

2.6.8 Results and Discussion

Table 1: Mean responses on the Type of Grey Literature Resources that should be collected and packaged.

S/N	Type of Grey Literature Resources Should be Collected and Packaged	X	Remarks
1.	Conference Papers	3.91	Agree
2.	Seminar/Workshop Papers	4.57	Strongly Agree
3.	Technical Reports	3.65	Agree

5.	Banks/Market Reports	3.52 Agree
6.	Manuscripts	4.55 Strongly Agree
7.	Chronicles	3.57 Agree
8.	Lecture Plans/Notes	3.52 Agree
9.	Speeches/Addresses	3.50 Agree
10.	Bibliographies	4.55 Strongly Agree
11.	E-Prints (Database Resources)	4.58 Strongly Agree

*The grey literature resources listed in the table are most common in the area of the study.

Source: Field Survey 2019

Table 1 shows that the mean score of all the item with regard to type of grey literature to be collected are above the criterion mean of acceptance set at 3.50 and with that all the grey listed are accepted to be collected with strong emphasis on seminar/workshop papers, research reports, Manuscripts, bibliographies, and e-prints.

Table 2: Mean responses on elements to be considered for the collection of Grey Literature Resources

S/N	Elements to be Considered for the Collection of Grey Literatures Resources	X	Remarks
1.	Originality (Originals not counterfeits)	4.84	Strongly Agree
2.	Relevancy (Related to the Users)	4.59	Strongly Agree
3.	Recency (Current or Topical)	3.57	Strongly Agree
4	Accessibility (Ease of Access)	4.55	Strongly Agree

Source: Field Survey 2019

In Table 2, all the four items are highly rated by the respondents, all items with mean score above four point five-zero (>4.50). Therefore the elements listed to be considered in collecting grey literature are strongly accepted.

Table 3: Mean responses on ways the Grey Literature Resources should be collected

S/N	Methodls throught Which Grey Literature Resources Should be Collected	X	Remarks
1.	Purchase (Raising Fund to Buy)	2.58	Undecided
2.	Subscription (Seeking Donation/Gift)	4.57	Strongly Agree
3.	Legal Deposit (Standing Order Deposit for		

	Staff/Sudents)	4.85	Strongly Agree
4.	Inter Library Collaboration (Exchange with other Libraries)	4.66	Strongly Agree
5.	Online Search (Acquiring free Resources from Web)	4.70	Strongly Agree

Source: Field Survey 2019

Data on Table 3 above represent the views of respondents with regards to the ways or methods through which grey literature should be collected. Looking at the table we can observe that the mean score of four of the items exceed the criterion mean of 3.50. It is therefore the views of the respondents that all items listed should be strong ways or methods through which grey literature should be collected except item number one that is undecided (x = 2.58).

Table 4: Mean responses on ways the Grey Literature Resources should be packaged

S/N	Forms Through Which Grey Literature Resources	X	Remarks
1.	Book Form (Subject by Subject)	4.97	Strongly Agree
2.	Periodical (in from o f Reviews)	3.54	Strongly Agree
3.	Annuals (in form of Reports)	1.42	Strongly Disagree

Source: Field Survey 2019

From Table 4, the result clearly showed that items one and two (i.e. book and periodical forms) are only ways accepted for the packaging of grey literature resources. Majority of respondents strongly disagree with the third item (x = 1.42).

2.6.9 Discussion

It was the opinions of the librarians in Documents units of the sampled libraries whose concern collection, preservation and dissemination of grey literature resources that the type of grey literature resources to be collected should include conference papers, seminar/workshop papers, technical reports, research reports (projects, thesis, dissertations), banks/market reports, manuscripts, chronicles, lecture plans/notes, speeches/addresses, bibliographies, and e-prints (database resources). Strong emphasis was laid on seminar/workshop papers, research reports, manuscripts, bibliographies, and e-prints than others. This may be attributed to the revelation of studies such as Obayomi (2015) and Enagi and Bida (2016) who listed such resources as most common online and prints also in colleges of education in Nigeria. In particular, Enagi and Bida (2016) revealed the high rate of abandoning of such resources by colleges of education

libraries in Nigeria. Thus, when collecting together grey resources for users in these institutions, emphasis should be laid on these kinds of materials than any others so as to meet up with the users needs.

Originality, relevancy, recency, and accessibility are strong elements overwhelmingly agreed by librarians and library officers manning grey resources to be considered when collecting grey resources for Nigeria Colleges of Education. These elements also top the list of Tunde (2018) with regards to collection of book materials. In fact, he lamented on the high rate of piracy in the country (Nigeria) and over abundance of worthless resources and advised that aforementioned elements should be thoroughly considered while acquiring materials for the library

The strong views of the respondents that subscription (i.e. seeking donation/gift), legal deposit (i.e. standing order deposit for staff/students), inter library collaboration (i.e. exchange with other libraries), and online search (i.e. acquiring free resources from web) should be ways through which grey literature should be collected except purchasing method. This may not be farfetched from the ideas of Omeje (2010) and Enagi (2014) on characteristics of grey literature resources as unconventionally published or semi conventionally published but not marketed as usual and not usually available through conventional sources of book supply. This might be the reason for low acceptability of purchasing method to the acquisition of grey resources because even if there is money to purchase them they are not often sold.

The ample acceptability of book and periodical forms as ways of packaging grey literature resources is in line with Mukhtar (2009) who earlier suggested for the packaging of abundance research reports deposited in research institutes in these formats. Again, grey resources if presented in these formats will serve the same ways of books and journals familiar with and gain wider acceptability. It will also checkmate some of the negative tendencies attached to it such as not been published, marketed and covered by secondary bibliographic services (indexes, abstracts and bibliographies).

2.6.10 Implication of the findings

The findings of this undertaken are of immense benefit to managers of library and information centres particularly in Nigeria because it unveiled type of grey literature resources to be collected, elements to be considered, and ways through which grey resources print and electronic should be collected and packaged. The findings would create awareness and guide stake holders in education in finding alternative to the scarce published materials. It would also open up opportunities for creative writing and utilization.

2.6.11 Conclusion

For meaningful utilization of grey literature resource (print or electronic) in Nigeria institutions particularly Colleges of Education effort must be made to better its collection and packaging. And for successful implementation of this, i.e. collection and packaging of grey literature resources, searches must be made on type of grey literature resources to be collected, elements to be considered, and ways through which it should be collected and packaged and this is what this study came with.

2.6.12. Recommendations

In view of the findings above recommendations are made and are as follows:

1. The curriculum of education and collection development policies of libraries of institutions in Nigeria should be reviewed to capture collection, packaging and utilization of grey literature resources especially electronic resources.
2. As earlier suggested by Aina (1994) that every country in Africa should establish a National Documentation Centre for grey literature with sole objective of collecting, organizing and disseminating grey literature, so also colleges and other institutions in Nigeria should establish a Documentation Centre for grey literature resources with sole objective of collecting, organizing, packaging and disseminating grey literature resources with special consideration to electronic grey literature resources.
3. The need to establish synergy between the stakeholders for successful collection and packaging of grey literature resources is essential. The stakeholders in academic institutions are management team, library management, library staff, and entire staff and students of the institution.
4. Full support from all concerned in terms of fund and facilities required to actualise collection and packaging of grey literature resources is hereby recommended.

2.7 Chapter Summary

What is covered in this chapter are:

- § Definition and types of multimedia resources
- § Ements of multimedia resources
- § Procedures in multimedia resources selection
- § Criteria for selecting multimedia resources
- § Categories of library software
- § Participants in Library Software Selection
- § Library software selection aids
- § Proceedures for Selecting Library Software
- § The concept of cryptocurrency
- § Types of cryptocurrencies

§ An account of emerging economy of cryptocurrencies in different nations

§ Values of cryptocurrency usage in collection development in Nigeria libraries

§ Electronic grey literature resources collection: Strategies for libraries in Nigeria Type of electronic grey literature resources to be collected and packaged for home use

§ Elements to be considered for the collection of electronic grey literature resources for home use

§ Ways through which electronic grey literature resources should be collected, and

§ Ways through which electronic grey literature resources should be packaged for home use

2.8 Evaluation

1. Identify five multimedia resources.
2. Outline five elements of multimedia resources.
3. List five steps in multimedia resources selection
4. Mention five criteria for selecting multimedia resources.
5. Identify five categories of library software.
6. Ouline five major participants in Library Software Selection.
7. Enumerate five library software selection aids.
8. List five proceedures for Selecting Library Software.
9. Explain the term cryptocurrency.
10. Identify five types of cryptocurrencies.
11. Give account of emerging economy of cryptocurrencies in five nations including Nigeria.
12. Enumerate five values of cryptocurrency usage in collection development in Nigeria libraries.
13. List five type of electronic grey literature resources to be collected and packaged for home (Nigeria) use.
14. Identify five elements to be considered for the collection of electronic grey literature resources for home use.
15. Express five ways through which electronic grey literature resources should be collected for home use.
16. Mention five ways through which electronic grey literature resources should be packaged for home use.

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7

Chapter Three

Current trends and Issues of Automation in Library and Information Resources Organization & Preservation Exercise

[Cataloguing -Processing]

3.1 Chapter objectives

On completion of this chapter readers should be able to:

1. Describe the concept of Retrospective Conversion
2. Itemise procedures involve in Retrospective Conversion of bibliographic records (metadata)
3. Itemise procedures involve in Retrospective Conversion of book materials
4. List equipment used for Retrospective Conversion of book materials
5. Give account of efforts made on Retrospective Conversion in Nigeria
6. Explain the concept of Resources Description & Access (RDA)
7. Mention the merits of Resources Description & Access (RDA)
8. List structural parts of Resources Description & Access (RDA)
9. Distinguish between RDA and AACR2 Vocabularries
10. Identify major differences between RDA and AAR2
11. Itemise procedures in the mplementation of RDA
12. Identify some of the RDA Training Sources
13. Describe the system of Online Cataloguing
14. State functions and values of online cataloguing & catalogues
15. Outiline Online Cataloguing Procedures using WorldCat Services
16. Enumerate Online Cataloguing Procedures using Google
17. Describe the system of Online Public Access Catalogue (OPAC)
18. List Procedures in Searching Online Public Access Catalogue

19. Give account of ICT Utilization in Preserving and Accessing Information in libraries in Nigeria
20. Itemise Types of ICT resources used in libraries in Nigeria
21. Enumerate Number of Records in Database in libraries in Nigeria
22. List Library Software used in libraries in Nigeria
23. Identify Internet Access Technologies in libraries in Nigeria
24. Mention ICT-Based Library Activities performed in libraries in Nigeria
25. State ICT-Based Library Services offer in libraries in Nigeria
26. Identify Major challenges to the use of ICT in libraries in Nigeria
27. State Strategies for improving the use of ICT in libraries in Nigeria

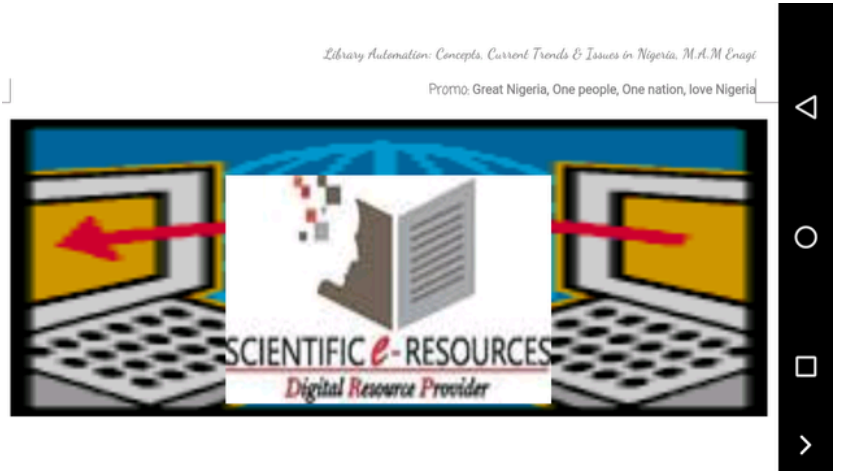
3.2 Chapter introduction

In this chapter users are introduced to:

1. The concept of Retrospective Conversion
2. Procedures involve in Retrospective Conversion of bibliographic records (metadata)
3. Procedures involve in Retrospective Conversion of book materials
4. Equipment used for Retrospective Conversion of book materials
5. Efforts made on Retrospective Conversion in Nigeria
6. The concept of Resources Description & Access (RDA)
7. The merits of Resources Description & Access (RDA)
8. The structural parts of Resources Description & Access (RDA)
9. Distincts between RDA and AACR2 Vocabularries
10. Differences between RDA and AAR2
11. Procedures in the mplementation of RDA
12. Some of the RDA Training Sources
13. The system of Online Cataloguing
14. Functions and values of online cataloguing & catalogues
15. Online Cataloguing Procedures using WorldCat Services
16. Online Cataloguing Procedures using Google
17. The system of Online Public Access Catalogue (OPAC)
18. Procedures in Searching Online Public Access Catalogue
19. An account of ICT Utilization in Preserving and Accessing Information in libraries in Nigeria
20. Types of ICT resources used in libraries in Nigeria
21. Number of Records in Database in libraries in Nigeria
22. Library Software used in libraries in Nigeria
23. Internet Access Technologies in libraries in Nigeria
24. ICT-Based Library Activities performed in libraries in Nigeria
25. ICT-Based Library Services offer in libraries in Nigeria

26. Major challenges to the use of ICT in libraries in Nigeria
27. Strategies for improving the use of ICT in libraries in Nigeria

3.3 Retrospective Conversion



HighLights:

- **Concept of Retrospective Conversion**
- **retrospective Conversion of Bibliographic Records (Metadata)**
- **retrospective Conversion of Book Materials**
- **Equipment for retrospective Conversion**
- **Procedures for Retrospective Conversion**
- **Efforts made on Retrospective Conversion in Nigeria**

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3.3.1 The Concept of Retrospective Conversion

Automation has sprang up new trends and issues in every segment of the library and information work from document creation/collection to preservation, organization and delivery/dissemination. Retrospective conversion is another way of improving the status of library collection and overall preservation. Convertion of hardcopies of materials to softcopies facilities preservation and organisation of the materials, and this is what retrospective conversion implies.

The term retrospective grammatically means looking back on past (event, situation or items) by way of studying, examining, improving, exhibiting or transcending it.

Technically and with regard to the field of library & information science, retrospective is taken as works created or published in the past, rather than current or recently issued materials. Thus, in the same field, retrospective conversion specifically refers to as the process of converting existing manual or human-readable bibliographic records into machine-readable format. But in another way and in a more general sense, it is the process of converting nondigital source material to digital form (Reitz, 2004). This encompassing conversion of all kinds of past created or existing nondigital (non-electrform) materials to digital or electronic formats. That is a process of converting hardcopies of materials to softcopies, normally to be accessed offline or online. This i also known as digitisation. A lot of academic libraries in Nigeria are putting more efforts in digitising existing manual records especially projects of students and staff in their institutions. This is as a support received from Tertiary Education Trust Fund (TETFund).

3.3.2 Retrospective Conversion of Bibliographic Records (Metadata)

The process of converting existing bibliographic records (metadata) from non-electronic (manual) to electronic form is normally done by matching manual records one after one to those already in an authoritative database of electronic records. Once match made, downloads of electronic records are made, and this can be as much as needed. OCLC provides most of the MARC records used in retrospective conversion across different nations. In this case equipment needed is a computer system with internet service provision to lunch on OCLC menu and carry out the exercise.

3.3.3 Retrospective Conversion of Book Materials

Retrospective conversion of existing hardcopies of book and non-book materials to softcopies is a current trend in most tertiary institution libraries in Nigeria. This is been supported by Tertiary Education Trust Fund (TETFund) and specifically covers research reports (projects, thesis, dissertations) of graduated students in various institutions. The process of converting nondigital book material to digital form required methodological planning, proper funding, and provision of appropriate equipment. Equipment required in the exercise and procedures involved are explicitly discussed below as well as brief note on efforts made on retrospective conversion in Nigeria.

3.3.4 Equipment for Retrospective Conversion

In retrospective conversion, the items listed below are used;

1. **The Scanner:** A peripheral device that convert printed texts/graphics or barcodes into machine readable or digital format for processing or display on a computer screen.

2. **The Computer System:** An electronic device that performs mathematical calculations, logical operations and process (manipulate texts & graphics), store and retrieve large amount of data very quickly. Also, access and share data on net.

3. **The Buffa:** a personal cloud storage device usually RAM, used for storing data while it is being processed or transfer between two system components that have different operating speeds, e.g., scanner and CPU.

4. **The Router:** a connector to the internet that link/share documents scanned. Router is a hardware device that performs many functions in the control of network traffic, it directs the tiny packets of digital data comprising an electronic message from one node on a computer network to another by the most efficient pathway (Reitz, 2004).

3.3.5 Procedures for Retrospective Conversion

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HighLights:

« **Connect & turn-on the gadgets**
« **Lunch the application - the Navigator**
« **Unveil OCR (Optical Character Recognition)**
« **Lunch the Kupar (the application software for scanning)**
« **Click on PDFEX**
« **Place the document to be scanned on the screen**
« **Click on *scan* to capture the page or document**
« **Click on *finish* to save pages as an entity**
« **For Remote Access by users,**
lunch on *teamviewer* application software
« **Go to settings and click on more to view PDF**
« **Click on PDF to view PDFx and then**
« **Click on this (PDFx) to connect to Internet**

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Retrospective conversion is a series of activities done sequentially. From the beginning, clear criteria and proper manners should be set aside for the collection of materials to be scanned and converted to electronic formats to actualise the aims of doing so. Empirical research presented above (in chapter three) throws light to this with regards to the strategies for collection of grey literature resources either for conversion or packaging for use. It is when materials are collected the steps below are sequentially followed.

1. First connect and turn-on all the gadgets (scanner, computer, router, and buffer) and then,

2. Lunch the application (Navigator) to ascertain connectivity. Once the connectivity is normal then,

3. Unveil **OCR (**Optical Character Recognition) to view applications for scanning including Kupar software used for scanning book.

4. Lunch the **Kupar** procedures station software for scanning) to open and permit scanning of document/book page by page.

5. Click on **PDFEX**

6. Place the document to be scanned on the screen of the scanner properly. This should be done page by page as you scan.

7. Click on ***scan*** to capture the page or document. If it is a book, as you scan, the pages will be arranged automatically, and as you finished scanning all pages of a book then,

8. Click on ***finish*** and all pages will be saved as an entity (a book) in Buffalo storage device.

9. For Remote Access by users, lunch on ***TeamViewer*** application software installed in the computer. Go to settings and click on **more** to view PDF, click on **PDF** to view PDFx and then click on this (**PDFx**) to connect to Internet through the router.

3.3.6 Efforts Made on Retrospective Conversion in Nigeria

Retrospective conversion of students' research reports is a current exercise in academic libraries in Nigeria supported by Tertiary Education Trust Fund (TETFund). The reports cover projects, thesis and dissertation containing reports of research carried out by students in partial fulfillment for the award of various certificates; degrees (bachelors, masters, doctorates), NCEs, diplomas and professional courses. This when done is expected to be saved in a single depository link to net. This effort when accomplished would facilitate usage of research findings in Nigeria and also reduced duplication of efforts. A browse on this treasure would allow researchers identify gaps that exist in research and where to play part. Also, issues of plagiarism and piracy would be checked and easily trapped. Beside these, there would be promotion of local contents consumption; the consumption of intellectual write-ups coming out of the country (Nigeria) and excel of these write-ups to other nations.

However, this gesture is expected to be extended to other important print literature resources that constitute larger part of collection in Nigeria libraries and in the institutions where libraries are located. But the beginning with research reports is an indication of extending to other literature resources. And when this is done, there would be increase in number of electronic literature resources in Nigeria libraries.

In the light of above, findings of the empirical research presented below on the strategies for collection of electronic grey literature resources can be applied as well in the collection and synthesis of grey literature resources floating in and around library communities for retrospective conversion.

3.4 Resources Description and Access (RDA)

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HighLights:

« **The Concept of Resources Description & Access (RDA)**
« **Merits of Resources Description & Access (RDA)**
« **The Structure of Resources Description & Access**
RDA Vocabulary in Comparison with AACR2
« **RDA Differences with AAR2**
« **Implementation of RDA**
« **RDA Training Sources**

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Resources Description and Access (RDA) is a well-developed library cataloging system that is pushing away card catalogue format in the libraries. In fact, it has even pushed away card catalogues in many libraries in Nigeria. And in where they present, their presence is adversely ignored. Ever since, according to Nwosu (2012) the card catalogue is a long-departed technology.

Resources Description and Access (RDA) is a well-developed library cataloging code used to describes every single material in the library and an efficient aid to accessing information resources. As a matter of fact, Resources Description and Access metamorphosis from AACR2R - the revised edition of AACR2 in 2002. RDA was built to encompassing requirements for cataloguing many media including Portable Document Fomart (PDF) or coded Extensible Markup Language's (XML). The building of RDA is in such way that captures facilitating components (description, relationships, authority, control and appendices).

3.4.1 Merits of Resources Description & Access (RDA)

Resources Description & Access (RDA) provides a comprehensive set of guidelines and institutions for resources description and accessing encompassing all categories of media. The essence of RDA is to establish Library cataloguing code that facilitates information resources organisation and retrieval; a very fast and easy way of accessing library information resources. And this is achieved with the outcome of RDA. Unlike AACR2R, RDA is suitable to cataloguing Portable Document Format (PDF) and coded Extensible Markup Language (XML) as well as other media. In fact, the challenges faced with the use of AAR2R in cataloguing PDF and XML documents necessitated the development of RDA by a joint committee for the revision of AACR and an International Committee of Library and research institutions. RDA provides sufficient guidelines for resources description and access encompassing types and contents of

media. An aid to easy identification, selection, and locating required information resource(s).

3.4.2 The Structure of Resources Description & Access (RDA)

Resources Description and Access (RDA) is structurally divided into:

- CORE elements
- Alternative rules
- Optional omissions & additions
- 'Or' instructions, and
- Local policies

3.4.3 Resources Description & Access (RDA) Vocabulary in Comparison with AACR2

AACR2:		RDA:
· Heading	=	Authorised Access Point
· Author/Composer	=	Creator
· Main entary	=	Preferred title/Authorised Access Point
· Uniform title.	=	Preferred title or Conventional Collective Title
· See reference.	=	Variant Access Point

3.4.4 Resources Description & Access (RDA) Differences with AAR2

« **Difference in Scope:**

AACR2:

Here description is based on

- **ISBD elements**
- **Class of materials**
- **Mode of issuance**
- **Type of description**

Access is based on

- **Choice of access pointspoints**
- **Form of headings**
- **Reference**

RDA:

Here description is based on

- **Attributes of FRBR entities**
- **Types of content and carrier**
- **Mode of issuance**
- **Type of description**

Access is based on

- **FRBR relationships**
- **Attributes ofvFRAD entities**
- **FRAD relationships**
- **Subject relationships**

Source: El-Shabini (2013)

« **Difference in Description**

There are changes brought by RDA with regards to used terms. RDA came up with new terms that replaced some familiar terms of AACR2. The new terms are derived

from functionality perspective and international cataloguing principles earlier established. Below are these:

AACR2:	RDA:
Areas	Elements
Heading	Authorised Access Point
Main entry	Authorised Access Point for creator + preferred title
Author, Composer, etc.	Creator
See reference	Variant Access Point
See also reference	Authorised Access Point
Adds entries	Access Points
Physical description	Carrier Description
Chief source	Preferred source
Uniform title	Preferred title + other information to differente
Note	Conventional collective title
General Material Designation (GMD)	Describing content IR recording relationships replaced by: Media type Carrier type Content type

Source: El-Shabini (2013)

3.4.5 Procedures for the Implementation of RDA

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HighLights:

« **Implementation Team Establishment Stage**
« **Exploration Stage**
« **Installation Stage**
« **Initial Implementation Stage**
« **Full Implementation Stage**
« **Project Monitoring & Evaluation Stage**

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Resources Description and Access (RDA) implementation is an easy task but until librarians of the concerned library are determined to do so. The challenges often for seen in the implementation RDA are largely attributed to human factor. However, as far as 2013 Fixsen et al itemised the implementation stages of RDA as; Exploration, Installation, Initial Implementation, and Full Implementation. In addition to these, from

the administrative point of view, is the establishment of implementation team from the begging and monitoring & evaluation of the exercise at the end and time-to-time. These are represented below:

1. Implementation Team Establishment Stage

Selection of formidable implementation team should be the first stage in every task of project implementation. Although Fixsen eta al (2013) begins with exploration stage but some individuals made mention of team selection as the beginning. One of these individuals is Jagboro (2015) in a paper titled ***Implementing RDA in Your ILS: Achieving User-Freindly Access to Information'*** he said the first step towards implementation of RDA in any library is to select an Implementation Team. The memberships of this team should be seasoned catalogers and well knowledgeable of AACR2 as well as possess ample knowledge of RDA. The memberships must be charismatic enough to implement other stages of implementation that follows.

2. Exploration Stage

This is the foundation stage and where work start and where solid foundation be laid for other tasks ahead. Appropriate discharge of this stage entails the success of others and vice-vasal. According to Jagboro (2015) this is the preliminary stage that requires a lot of planning, training, identification of needed resources and development of local policies. In planning, a lot of factors should be considered including cataloguing staff strength of the library, staff to be trained, coast implications, where/how to source RDA toolkit (online subscription or book form), acceptation and exemption of things/rules, and when/where to start. Also at this stage, a decision needs to be taken on whether to start with new records or modifying existing records, and way of cataloguing (copy cataloguing or original cataloguing). These are few factors but other factors exist that should be considered at this stage.

3. Installation Stage

This is a critical stage of installing equipment and facilities needed to do the work ahead. At this stage, Implementation team help organization secure the needed resources (such as the RDA toolkits) to execute the work ahead and prepare (coach) the staff for the new practices. Putting in pace facilities and preparing staff for the practice need serious attention of implementation team because failure in this would definitely lead to failure of the all exercise.

4. Initial Implementation Stage

This is the initial stage when RDA is being used for the first time in the library. It is another critical stage that also needs serious attention of implementation team and all stakeholders. At this stage, selected staffs for the task are putting into use the newly acquired skills. A lot of challenges may be faced at this stage due to awkwardness associated with trying new things and changing from system of work quite familiar with. The beginning of the initial implementation stage is while RDA set at Day One. If the library has set its RDA Day One, it would be good to start data inputting with LMS demo until staff develop some level of confidence (Jagboro, 2015). Also at this stage,

copy cataloguing is a good starting point. In this case, implementation staffs are to download records from LC, OCLC or from the library that has already implemented RDA. Records when downloaded, make necessary changes inline with local RDA documentation but maintain degree of uniformity in online catalogue. However, the implementation team should give the needed support and encouragement to cataloguing staff so as to concentrate on the work and achieve high level of success.

5. Full Implementation Stage

Unlike initial implementation stage, at full implementation stage cataloguing staff members are already familiar with the new system, what is now needed is improvement upon quality of service. Attainment of full Implementation is when fifty percent (50%) or greater than that (50%>) of the staff and team members are used to RDA; using it effectively with appreciable level of fidelity and good results. At this stage, the new ways of providing services are now the standard ways of work where practitioners and staff routinely provide high quality services (Jagboro, 2015). And at this end, frequent evaluation of the exercise is necessary to achieve and maintain standard ways of work.

6. Project Monitoring & Evaluation Stage

Evaluation exercise is a critical stage in every task. This is to ascertain the level of compliance, achievement or degree of outcome (the end result). As earlier stated, the level of achievement in the RDA implementation is when fifty percent (50%) or greater than fifty percent (50%>) of the staff and team members are used to RDA; using it effectively with appreciable level of fidelity and good results. To set a high target, eighty percent and above (80>) can be targeted as level of achievement. Implementation evaluation should be a continuous exercise once implementation exercise attained appreciable level. This is to identity challenges face in implementing RDA and proffer solutions. With this, the exercise would be sustained, improved, and quality services assured. Moreover, monitory and evaluation of RDA exercise with particular reference to copy-cataloguing is also necessary in order to maintain degree of uniformity in online cataloguing and catalogues.

3.4.6 Resources Description & Access (RDA) Training Sources

There many avenues for the training of RDA; online and offline, local and international. Some major sources are:

- RDA Toolkit: Teaching & Training http://www.RDA toolkit.org/training
- OCLC: About RDA http://www.OCLC.org/RDA/about.end.html
- Library of Congress (LC) RDA Training Materials http://www.loc.gov/cat workshop/RDA%20training%materials/index.html
- ALCTS (Association for Library Collection & Technical Services) Cataloguing & RDA Webinars http://www.ala.org/alcts/confevents/upcoming/webinar/cat

3.5 Online Cataloguing

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HighLights:

- « **The system of Online Cataloguing**
- « **Functions and values of online cataloguing & catalogues**
- « **Online Cataloguing Procedures using WorldCat Services**
- « **Online Cataloguing Procedures using Google**
- « **The system of Online Public Access Catalogue (OPAC)**
- « **Procedures in Searching Online Public Access Catalogue**

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Online cataloguing is a contemporary trend worldwide but quite challenging in Nigerian libraries. The process of cataloging has been moved online. But as the beginning, it is good to review the all processes beggining from the starting point when Machine Readable Cataloguing (MARC) came to existence. MARC metamorphoses to online cataloguing and sharing. The development of computer and ability of it to be used in information manipulation but could not read nor handle records of card catalogues provided for in the AACR2R, arose the need for the development of a system to make computers read and interpret data in the cataloguing records. This was kickstarted as a pilot project for capturing and distributing Library of Congress catalogue records in machine-readable form to participated libraries. This effort resulted into a standard format for creation, distribution and exchange of all categories of bibliographic data in machine-readable forms. At this turn, in 1960s, Library of

Congress constituted a Taskforce (Retrospective Conversion - RECON) for a comprehensive study for the conversion of retrospective catalogue records in the library to machines readable forms. The report of this committee was published in 1969. Following this report, the Machine-Readable Cataloguing became an international standard accepted for bibliographic description in machine-readable form like the normal catalogue standards but contains additional information.

Beyond this, the different editions of MARC of the Library of Congress and National Library of Canada (USMARC and CANMARC) emerged but the two later harmonised for international usage under the name MARC21, with 21 signifying 21st century. And ever since, MARC has gain wider acceptance by libraries worldwide. With the expansion of automation and acceptance of MARC format by more number of libraries, **retrospective conversion** of existing manual records becomes greater, and this was the buttonline for **library Networkings** (cooperations and integration of computerised library systems and services worldwide through the Internet). Today, many individual libraries upload their catalogue records done off-line or manually on internet and cooperate in online cataloguing to jointly produce union catalogues, the likes of WorldCat. WorldCat is a union catalogue of libraries of participatory member country. WorldCat originates from Ohio College Library Center (OCLC) that was renamed 'Online Computer Library Centre (OCLC)'. Same to this is also Online Cataloguing of Library of Congress (OCLC) where participating libraries contribute its holdings and where cataloguing services provide to libraries across the globe within internet paths.

3.5.1 Online Cataloguing Procedures Using Worldcat Services

Online subject cataloguing (classification) is a trend in most Nigeria libraries especially academic libraries of tertiary institutions. Some of the libraries deploy the services of WorldCat to actualise the exercise. The steps in cataloguing window of WorldCat services are as follows:

1. First, on the computer and connect to the net
2. Enter into the WorldCat website
3. Sign on by entering authorisation code and password into the provided space-boxes and click a box written **'Log on'** to get access to other instructions. * Each library uses its peculiar authorisation code and password to access WorldCat services.
4. Choose and enter the type of search; Basic or Advanced. *In **Basic Search** only the ISBN is required to search for materials while in **Advanced Search** additional bibliographic details required.
5. For **Basic search**, enter ISBN in the **'search for'** bar and then click on it, the title will be displayed.
6. Select the title using cursor to click on it the full bibliographic details of title selected will be displayed.
7. Copy the bibliographic details to the worksheet or add to existing catalogues.

3.5.2 Online Cataloguing Procedures Using Google

Online subject cataloguing (classification) through **google** is also a trend in most libraries. Here are guidelines to online classification using google:

1. On the system and connect to the net (the Internet).
2. Key-in to the Google Search engine by typying the web address (http//www.google.com).
3. Type-in site address '**Library of Congress Online Cataloge**' at space provided. Do the typing even though the typing icon blinks and written address will surface.
4. Then click on the surfaced address 'Library of Congress Catalog' this brings out **Basic Search.**
5. Click on the Basic Search to see: -**Title**

   - **Subject**
   - **Call No.**
   - **LCCN, ISBN or ISSBN.**

6. Click again on **Basic Search** to see Basic Search and a box where you will type-in the title of the book and then click on search, this displays the bibliographic details of the book.
7. Then copy the **class Number** of the book. *For the **Call Number** if is not seen in the information displayed, click on the title of the book to view full information on worksheet that Call Number can be seen.

3.5.3 Online Public Access Catalogue (Opac)

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HighLights:

« **The system of Online Public Access Catalogue (OPAC)**

« **Functions and Values of Online Public Access Catalogue (OPAC)**

« **Procedures in Searching Online Public Access Catalogue (OPAC)**

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The internet has evolved into a resource for cataloging library materials and providing access to users of those materials. In this way, libraries are able to create words and notations for topic objects that are uniform and consistent, and union catalogues are the end result of today the likes of OPAC. Online Public Access Catalogue (OPAC) is a database composed of bibliographic records describing the books and other materials owned by a library or library system, accessible via public terminals or workstations usually concentrated near the reference desk of the libraries (Reitz, 2004). Online catalogues are in most cases searchable by author, title, subject, and some keywords. Online catalogues permit print, download, or export of records to e-mail account. The current Rubicon of library automation is an Online Public Access Catalogue (OPAC)

that is pooling libraries together across the world. An OPAC is simple designed to offer the followings:

1. To provide access to library materials
2. To provide multiple access points to library users
3. To give information about materials borrowed out of the library and those available in the stock of the library.

Online Public Access Catalogues gives users access to information at every level of the processing of resources and the final activity of circulation. Documents' technical processing may now be organized and utilised for higher productivity thanks to computer-based technology - the OPAC.

3.5.4 Procedures in Searching Online Public Access Catalogue (Opac)

The following are guidelines for searching records on online Public Access Catalogue:

1. Use the cursor to select preferred access points/search options (i.e., author, title, and subject).
2. Use the keyboard to type the search term/phrase in the search bar and click **'Begin search'** and wait for the result. *The search term or phrase could be author's surname, title or subject of what is required.
3. Use the cursor to select the desired title by clicking on it once and then click on 'view detail' the bibliographic details are displayed on a small pop-up window, within this a 'call mumber' or 'call mark' as the name implies. It is the call number required to locate the required material on the shelves.

3.6 ICT Utilization in Preserving and Accessing Information in Libraries of Colleges of Education in Nigeria

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***HighLights*:**

« **ICT Resources Use in the Libraries**
« **No. of Records in Database in the libraries**
« **Library Software Use in the surveyed Libraries**
« **Internet Technologies Use in the surveyed Libraries**
« **Computer&Related Technologies Activities in the Libraries**
« **ICT-based Library Services offered in the surveyed Libraries**
« **Challenges posed by the Use of ICT in the surveyed Libraries**
« **Strategies for Improving the Use of ICT in the surveyed Libraries**
« **ICT Utilization overall-proportion of Surveyed Libraries in Percentage**

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Abstract

ICT use in libraries in Nigeria started in the early 1990s. ICT usage in Nigeria has not made much progress as at the time. However, there has been significant improvement recently, notably at the libraries of Nigerian Colleges of Education (C.O.E), which were the focus of this research. The essence of the research was to assess the role of ICT in these libraries, obstacles to ICT usage, and possible solutions to the obstacles. Eight research questions served as the study's guiding principles, and a descriptive survey research design was used. Simple random selection was conducted among a population of 60 librarians. Data gathering involved the use of a structured questionnaire. The gathered information was examined and displayed in a frequency table, with the proportion (or percentage) of each state being emphasized as needed. However, the research found that the majority of libraries in Nigerian colleges of education employ standalone computers with limited word processing and bibliographic database management capabilities. While others have a limited capacity for sharing external resources online and have an internet connection. Most libraries make use of the CDS/ISIS program. A network server and many PCs spread across the library's various sections make up the Graphical Library Automation System (GLAS), which is located in one of the libraries. This system is used to manage serials, acquire books, categorize them, and construct bibliographic databases. Even while ICT use has advanced significantly in the majority of libraries, it is still in its infancy in some of them. This was caused by a multitude of issues, including administrators' and policymakers' ignorance of the value of ICT, a lack of coordinated efforts, a lack of qualified labor, a lack of long-term planning, a lack of funding, and a lack of infrastructure. As a result, the report suggested that administrators, policy makers, and personnel be made aware of the significance of ICT, long-term planning, and the supply of enough budget and infrastructure, among other things.

3.6.1 Introduction

The globalization of information and knowledge resources is a result of ICT's (information and communication technology) increased acceptance and utilization. Users always have access to full-text texts, bibliographic databases, and digital library collections. There are obstacles in the way of this advancement, both technological and human-related. Prior to this study, other comparable studies conducted throughout the globe bemoaned various difficulties with ICT use, notably in libraries. Although Bangladesh was one of the early nations to start using information technology in 1964, the field of ICT-based libraries is still in its infancy today. Administrative obstacles, a shortage of competent labor, joint endeavors, financial assistance, infrastructure, and ICT training programs are just a few of the issues that Shariful-Islam and Nazmul-study Islam's identified as contributing to this unpleasant scenario. They said that compared to private and special libraries, these issues are far more serious in public libraries.

Another research on the use of ICT in public libraries in the Niger Republic found that a major barrier to the development or installation of ICT equipment in the libraries was a lack of understanding of technological advancements. That, most librarians in these libraries lack sufficient expertise of computer programs and automation, which is a problem for the area's use of ICT. Similar circumstances also exist in Ghana; in Annan's study on the use of ICT in Ghana's state libraries, it was noticed that a lack of funding had complicated the potential of ICT use in such libraries. More specifically, the establishment of ICT-based libraries in the region has been hampered by library staff members' resistance to new technology.

Kenya is one of the African nations that have gotten a lot of funding from foreign donors for ICT, but Anthony's research revealed that the influence of the funds is not truly felt due to library staff members' resistance to adopt new technology. Additionally, plans for ICT usage have not been provided by library officials. In Nigeria, public libraries experience ITC usage issues far more severely than university libraries do. This was observed in research performed by Aaron on the use of ICT in Nigerian public libraries. The development of ICT in the area is hampered by inadequate physical facilities, poor telecommunications infrastructure, and unstable power supplies. In addition, few libraries offer internet access.

However, it is important to remember that Nigerian libraries, particularly those at colleges of education, started utilizing computers in the early 1990s. Since then, there hasn't been much growth in Nigerian libraries' use of computers. However, there has been significant improvement recently, especially at Nigeria Colleges of Education (C.O.E) libraries. However, this dramatic incident in the libraries of Nigerian colleges of education calls for a scientific analysis of the situation, particularly in the colleges of the north central states where ICT use is at an all-time high, in order to determine the degree of advancement made in the use of ICT in this area. Five states—Abuja (Federal Capital Territory-Abuja), Benue, Kogi, Nasarawa, Niger, and plateau—as well as the federal capital were included in this region. The choice of the location was necessitated by the fact that no analogous research had been conducted in the area at the time, as had been done in other parts of Nigeria. Additionally, the researcher is familiar with the location and would have no trouble reaching the chosen respondents. Nigeria is the largest Africa country in west part of Africa with thirty-six states and Federal Capital Territory.

3.6.2 Purpose of the study

The purpose of this study was to determine the position of ICT in Nigeria Colleges of Education Libraries with specific aim of identifying;

i. The types of ICT resources used in the libraries
ii. The Number of Records in Database in the libraries
iii. The Library Software used in the libraries

iv. The Internet Access Technologies in the libraries
v. The ICT-Based Library Activities performed in the libraries
vi. The ICT-Based Library Services offer in the libraries
vii. The Major challenges to the use of ICT in the libraries, and
viii. The Strategies for improving the use of ICT in the libraries.

3.6.3 Research Questions

What type of ICT Resources used in the libraries?

i. What number of Records in Database in the libraries?
ii. What type of Library Software used in the libraries?
iii. What type of Internet Technologies used in the libraries?
iv. What type of Activities Performed by ICTs in the libraries?
v. What type of ICT-based Library Services offer in the libraries?
vi. What are the challenges to the use of ICT in the libraries?
vii. What are the strategies for improving the use of ICT in the libraries?

3.6.4 Methodology

This study used a descriptive survey research design as its methodology. In descriptive research, data are often gathered, arranged, and evaluated before being described in their natural environment [8]. Because the study's goal was to depict the real situation regarding the use of ICT in libraries at colleges of education in Nigeria, this design was judged appropriate for the study. Additionally, the choice of this design was influenced by Shariful Islam and Nazmul Islam's successful empirical research of the Use of ICT in Selected Libraries in Bangladesh (2007). A population of about 60 librarians was used. Using simple random sampling technique, sample size of 10 librarians from each state of North Central and FCT Abuja arrived at.

Data were gathered using a structured questionnaire, along with field observations and unstructured interviews. Three eminent scholars in the field of library and information science from the University of Nigeria face validated these instruments. These experts' contributions were taken into consideration and utilised in the study. Twelve research assistants, two from each state, assisted the researchers in administering the study equipment. These research assistants were librarians with background in managing research projects.

The gathered information was examined and displayed in a frequency table, with the proportion (or percentage) of each state being emphasized as needed. However, in order to support the data gathered through questionnaire, extra information was gained through field observation and an unstructured interview.

3.6.5 The Results

3.6.5.1 ICT Resources Used in Nigeria Colleges Of Education Libraries

To guarantee the effectiveness of the library activities, colleges of education in Nigeria utilize a variety of ICT equipment. The ICT resources in the examined libraries are displayed in the following table.

Table 1: ICT Resources Used in the Libraries

S/N	ICT facilities	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau
1	Computers (Cps)	245	106	154	102	103	108
2	Cps connected to Internet	127	95	132	93	76	99
3	CD-ROMs	108	06	27	13	-	22
4	Audio Cassettes	31	52	26	13	-	18
5	Video Cassettes	119	67	58	71	28	24
6	Scanners	4	2	2	1	2	1
7	Printers	3	2	4	1	3	2
8	Photocopiers	2	1	1	-	1	2
Total per Library		**639**	**331**	**404**	**294**	**213**	**276**

Note: the dash indicates no response which means not available.

In the table above it would be understood that library in federal capital-Abuja has higher number of ICT resources than others which signifies that it uses more number of ICT resources than others. The library in Niger state has the lowest number of ICT resources followed by plateau and Nasarawa states, which signifies that the libraries in these states use less numbers of ICT resources when compared with other libraries. It would also be learnt that total number of two thousand one hundred and fifty-seven ICT resources are available in all of the libraries surveyed.

3.6.5. 2. Number of Records in Database In the Libraries.

The following table displays the database's record count in comparison to the overall library collection as well as its ratio to the total collection.

Table 2: Number of Records in Database in the Libraries

S/N	Library collection	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau	Total

1	Total library collection (Books and non-books)	6,017	5,922	7,528	4,424	7,361	5,571	36,823
2	No. of records in Database	126	97	109	57	12	09	410
3	Ratio between total no. of records and no. of records in database	0.2	0.1	0.1	0.1	0.02	0.02	0.1

Studying the table two above, it would be learnt that all the surveyed libraries have less number of records in database when compared with the total library collection because non of the libraries ratio reached one. FCT-Abuja libraries top the list of the ratio followed by Kogi state libraries not Benue state because Kogi has greater number of records in the database than Benue. Libraries of Niger and Plateau are far left behind when compared with some of the libraries.

3.4.5. 3 Types Of Library Software In Use In The Libraries.

The following table shows the software used by the libraries:

Table 3: Library Software Used in the Libraries

S/N	Library Software	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau
1	Library Management Software (locally developed)	-	-	-	-	-	√
2	CDS/ISIS (For indexing journals and newspapers)	√	√	√	√	-	-
3	Library MIS (Based upon CDS/ISIS)	√	-	√	-	-	-

4	GLAS (Graphical Library Automation System)	1	-	-	-	-	-	1
5	Alice for windows	-	-	-	-	√	√	2
Total per Library		3	1	2	1	1	2	10

Note: the dash indicates no response which means not used.

Table three above indicates that only FCT-Abuja library used three different types of software including GLAS software while others use two or one. In Plateau there is a locally developed Library Management Software.

3.6.5.4 Internet Access Technologies in The Libraries.

Table 4: Internet Technologies Used in the Libraries

S/N	Library Software	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau	Tot
1	Availability of Internet Infrastructure	√	√	√	√	√	√	6
2	Number of computers (i.e., access points)	127	95	132	93	76	99	62
3	Average users per day	200	150	170	150	100	150	890
Ratio between access points and average no. of users		0.6	0.6	0.7	0.6	0.7	0.6	0.6

Table four depicts availability of Internet infrastructure in all the surveyed libraries, and also depicts that the access points in these libraries are far below the demand of the users because the number of computers (i.e., access points) in almost all libraries are not up to the average number of users per day. Going by ratio above, two or more users are to share a point at a time a such they ended up waiting lining up for

3.6.5.5. Ict-Based Library Activities Performed in The LIBRARIES

Table 5: Activities Performed by Computer and Related Technologies in the Libraries

S/N	Activities	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau	To
1	Data Processing	√	√	√	√	√	√	
2	Communication	√	-	√	√	-	√	
3	Circulation	√	-	√	√	-	√	

5	Bibliography	√	√	√	√	√	√	6
6	Serial control	√	-	√	-	-	-	2
7	Preparing in house database	√	-	√	-	√	-	3
Total per Library		7	3	7	5	4	5	31

Note: the dash indicates no response which means not available.

In table five, Abuja and Kogi top the list of the activities performed by computer and related technologies, followed by Nasarawa and plateau states. Benue is the least in the table. It is also clear in this table that most libraries use computers for data processing and bibliographic analysis and preparation.

3.6.5.6. ICT-Based Library Services Offer in The Libraries

The following table illustrates the different services provided by the libraries: Table 6: ICT-based Library Services in the Libraries

S/N	ICT-based library Facilities	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau
1	CD-ROM Searching	√	-	√	√	√	√
2	Online Searching	√	√	√	√	-	√
3	Online Networking	√	-	√	√	-	√
4	Online Information Service	√	√	√	√	√	√
5	Online Reservation Service	√	-	√	-	-	-
6	Database Searching Service	√	√	√	√	√	√
7	News Clipping Scanning Service	-	-	√	-	√	-
8	Photocopying Service	√	√	√	√	-	√
Total per Library		7	4	8	6	4	6

Note: the dash indicates no response which means not available.

In the table above it would be understand that online information service and database searching service are provided by all libraries. Kogi top the list of ICT-based Library Services provided by the surveyed libraries followed by FCT-Abuja and others. Abuja and Kogi also admitted providing online reservation service. Similarly, Kogi and Niger admitted providing news clipping scanning service. CD-ROM searching, online searching and photocopying services are provided by almost all libraries except few.

3.6.5.7. Major Challenges to The Use Of Ict In The Libraries.

Table 7: Challenges to the Use of ICT in the Libraries

S/N	Challenges	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau
1	Administrative barriers	√	√	√	√	√	√
2	Psychological Barriers	-	√	√	√	√	-
3	Lack of long-term planning	√	√	√	√	√	√
4	Lack of E-Resources Selection Policy	-	√	√	√	√	√
5	Lack of financial support	-	√	√	√	√	√
6	Lack of infrastructure	-	√	-	√	-	√
7	Lack of ICT resources	-	√	-	√	√	-
8	Absence of local resources	-	√	-	√	√	-
9	Lack of Networks	-	√	-	-	√	-
10	Lack of skilled manpower	-	√	-	√	√	√
11	Lack of shared initiatives	-	√	√	√	√	-
12	Lack of ICT Training Programs	-	√	√	√	√	√
Total per Library		2	12	8	11	11	7

Note: the dash indicates no response which means not agreed.

Table seven indicates the prevalence of the challenges of administrative barriers and lack of long-term planning among other challenges as it was agreed by all libraries. These were followed by lack of ICT Training Programs, E-Resources selection policy and financial support to acquisition and management of ICT resources. Almost all libraries disagreed with the challenges of lack of networks except those in Niger and

Benue states. Looking at the total number of challenges indicated by the libraries, Benue top the list followed by Nassarawa and Niger. The least is FCT-Abuja which indicated only two challenges namely; administrative barriers and lack of long-term planning.

3.6.5.8. Strategies For Improving The Use Of Ict In The Libraries.

Table 8: Strategies for Improving the Use of ICT in the Libraries

S/N	Strategies	States: Abuja	Benue	Kogi	Nasarawa	Niger	Plateau	T
1	Removal of Administrative barriers	√	√	√	√	√	√	6
2	Sensitization on importance of ICT	√	√	√	√	√	√	6
3	Provision of long-term plans on ICT	√	√	√	√	√	√	6
4	Provision of E-Resources Selection Policy	-	√	√	√	√	-	4
5	Provision of adequate fund	√	√	√	√	√	√	6
6	Provision of adequate infrastructure	√	√	-	√	√	√	5
7	Provision of adequate ICT resources	-	√	√	√	√	-	4
8	Provision of local resources	√	√	√	√	√	√	6
9	Provision of Networks	-	√	-	-	√	√	3
10	Provision of skilled manpower	√	√	√	√	√	√	6
11	Encouraging shared initiatives	√	√	√	√	√	√	6

12	Provision of ICT Training Programs	√	√	√	√	√	√	6
Total per Library		9	12	10	11	12	10	64

Note: the dash indicates no response which means not priority.

Table eight above indicates acceptance of almost all outlined strategies for improving the use of ICT in the libraries except item seven (Provision of adequate ICT resources) and nine (provision of networks) that the responses average, which signify that those items are available in the area. So, they are not main concern to them.

3.6.5.9. Overall Proportion of ICT Utilization In The Surveyed Libraries

Table 9: ICT Utilization proportion of Surveyed Libraries in Percentage (%)

S/N	**STATES**	**ITEMS**					
S/no.	Libraries Per States	ICT Resources Used	No. of Records in Database	Library Software Used	Internet Access Points	Computer & Tech Related Activities	ICT-based Library Serv
1	**Abuja**	639	126	3	127	7	7
2	**Kogi**	404	109	2	132	7	8
3	**Benue**	331	97	1	95	3	4
4	**Nasarawa**	294	57	1	93	5	6
5	**Plateau**	276	09	2	99	5	6
6	**Niger**	213	12	1	76	4	4
Total per library		2157	410	10	622	31	35

Table nine above brought together overall ICT utilization in the surveyed libraries. FCT-Abuja tops the list with 31%, followed by Kogi (19%) and Benue (15%). Nasarawa and Plateau at par (12%) while Niger the least with 11%.

3.6.6 Discussion of Findings

ICT Utilization in Nigeria Libraries, an empirical study of libraries of Colleges of Education was conducted in North-Central states of Nigeria and the results are discussed below:

Respect to the types of ICT equipment use in the libraries, the result shows that libraries of Colleges of Education in Nigeria use various types of ICT equipment to ensure efficiency of the library activities. The library of federal capital-Abuja has higher number of ICT resources than others which signifies that it uses more number of ICT resources than others. The library in Niger state has the lowest number of ICT resources followed by Plateau and Nasarawa states which signifies that the libraries in these states

use less numbers of ICT resources compared to other libraries. The study also point out that for creating and maintaining a database, FCT-Abuja library use three different types of software including GLAS, while others use two or one. Most libraries use CDS/ISIS software. Plateau has a locally developed Library Management Software use for bibliographic analysis and classing.

With respect to number of records in database, all libraries have less number of records in database compared to the total library collection because none of the libraries ratio reaches one. FCT-Abuja libraries have the highest followed by Kogi and Benue states while Niger and Plateau the least. |Factors attributed to this ware lack of infrastructure and financial backing.

Regarding availability of internet infrastructure, most of the libraries are connected to net but the number of access points is far below the demand of the users because the numbers of computers used to access data in almost all libraries are not up to the average number of users per day. Since the internet is so important in libraries, there has to be a larger number of computers available there to meet user requirements. It may resemble a virtual library where users can access all of the world's knowledge sources. The barrier of distance in communication has been overcome. It has had a significant impact on librarianship practice.

Abuja and Kogi top the list of the activities performed by computer and related technologies followed by Nasarawa and plateau states. This situation may be attributed to high level of awareness of information technology in these areas. Benue is the least and may be attributed to low level of awareness of information technology. Moreover, most libraries use computers for data processing and bibliographic analysis and for creating an in-house database. Kogi top the list of ICT-based Library Services provided by the libraries followed by FCT-Abuja and others. Online information service and database searching service are top ICT services provided by all libraries. Abuja and Kogi admitted providing online reservation service. Similarly, Kogi and Niger admitted providing news clipping scanning service. CD-ROM searching, online searching and photocopying services are provided by almost all libraries except few. The Federal Colleges of Education were early adopters of utilizing computers to create bibliographic databases. The Graphical Library Automation System (GLAS) library software has been installed at the FCT-Abuja library, which is also furnished with a network server, several PCs, and a Local Area Network (LAN) that connects the various library departments. However, most libraries only utilize computers as standalone devices for word processing and maintaining bibliographic databases. There isn't a single completely automated library. The automation and networking processes are only getting started in certain libraries. Although some libraries have CD-ROM access, there has been little effort made to generate information goods on CDs. Some libraries offer limited external resource sharing via online connections and connections to the Internet.

The challenges admitted facing ICT utilization in the libraries are enormous. The prevalence of administrative barriers and lack of long-term planning among other challenges were noted. Most libraries lack planning and acquisition policy for ICT. Lack of ICT training programs and financial support to acquisition and maintenance of ICT resources are factors militating use of ICT in these libraries. Almost all libraries disagreed with the challenges of lack of networks except Niger and Benue states. This goes to show the availability of network in the libraries but allowing users wider access to it is the case. In these libraries users are confined to the domain of the library to access data. In all, looking at the total number of ICT challenges indicated by the libraries, Benue top the list followed by Nasarawa and Niger. The least is FCT-Abuja which indicated only two challenges namely; administrative barriers and lack of long-term planning. This may be priority it receives than others because of it being in capital city, and this is in line with the assertion of Adamu that in Nigeria, city libraries receive more attention in terms of ICT than libraries elsewhere [9]. Information revolution is a thing in major cities in Africa as a whole left alone rural area that constitute majority of African population and landmass, and that is what Rodriguez and Wilson seem as poor countries losing the information revolution [10].

3.6.7 Conclusion

The use of ICT in libraries and information centers is expanding globally. The libraries of Nigerian colleges of education require this technology now more than ever. The need for ICT in Nigerian colleges of education is expanding for a variety of reasons, including a rise in users and a higher demand for library items, particularly new electronic forms and sources. Although several of these universities' libraries have achieved considerable advancements in this area, there is still more to be done to meet the need of an increasing user base. To address the evolving needs of their users, librarians, library supporters, and administration of these institutions must work together to create ICT-based libraries.

3.6.8 Recommendations

For effective utilization of ICT in the studied area the following recommendations are made:

§ Long-term planning should be provided, and superfluous obstacles should be removed to make it easier to purchase, maintain, and use ICT in libraries.

§ Provision of sufficient funds for the installation and upkeep of ICT facilities in libraries

§ Provision of a thorough collection development policy for online resources

§ More qualified and experienced staff should be made available in libraries.

§ Allow users access to the internet.

§ Parental groups and the government should support libraries.

Regular holding of seminars and workshops to train library staff in computer applications More significantly, the libraries of the Nigeria College of Education should create a consolidated database that contains all of the country's papers and information sources and is connected to other worldwide networks. This will facilitate access to information and support scientific research.

3.7 Chapter Summary

What is covered in this chapter are:

§ The concept of Retrospective Conversion

§ Procedures involve in Retrospective Conversion of bibliographic records (metadata)

§ Procedures involve in Retrospective Conversion of book materials

§ Equipment used for Retrospective Conversion of book materials

§ Efforts made on Retrospective Conversion in Nigeria

§ The concept of Resources Description & Access (RDA)

§ The merits of Resources Description & Access (RDA)

§ The structural parts of Resources Description & Access (RDA)

§ Distincts between RDA and AACR2 Vocabularries

§ Differences between RDA and AAR2

§ Procedures in the mplementation of RDA

§ Some of the RDA Training Sources

§ The system of Online Cataloguing

§ Functions and values of online cataloguing & catalogues

§ Online Cataloguing Procedures using WorldCat Services

§ Online Cataloguing Procedures using Google

§ The system of Online Public Access Catalogue (OPAC)

§ Procedures in Searching Online Public Access Catalogue

§ An account of ICT Utilization in Preserving and Accessing Information in libraries in Nigeria

§ Types of ICT resources used in libraries in Nigeria

§ Number of Records in Database in libraries in Nigeria

§ Library Software used in libraries in Nigeria

§ Internet Access Technologies in libraries in Nigeria

§ ICT-Based Library Activities performed in libraries in Nigeria

§ ICT-Based Library Services offer in libraries in Nigeria

§ Major challenges to the use of ICT in libraries in Nigeria

§ Strategies for improving the use of ICT in libraries in Nigeria

3.8. Evaluation

§ Describe the concept of Retrospective Conversion

§ Itemise procedures involve in Retrospective Conversion of bibliographic records (metadata)

§ Itemise procedures involve in Retrospective Conversion of book materials

§ List equipment used for Retrospective Conversion of book materials

§ Give account of efforts made on Retrospective Conversion in Nigeria

§ Explain the concept of Resources Description & Access (RDA)

§ Mention the merits of Resources Description & Access (RDA)

§ List structural parts of Resources Description & Access (RDA)

§ Distinguish between RDA and AACR2 Vocabularries

§ Identify major differences between RDA and AAR2

§ Itemise procedures in the mplementation of RDA

§ Identify some of the RDA Training Sources

§ Describe the system of Online Cataloguing

§ State functions and values of online cataloguing & catalogues

§ Outiline Online Cataloguing Procedures using WorldCat Services

§ Enumerate Online Cataloguing Procedures using Google

§ Describe the system of Online Public Access Catalogue (OPAC)

§ List Procedures in Searching Online Public Access Catalogue

§ Give account of ICT Utilization in Preserving and Accessing Information in libraries in Nigeria

§ Itemise Types of ICT resources used in libraries in Nigeria

§ Enumerate Number of Records in Database in libraries in Nigeria

§ List Library Software used in libraries in Nigeria

§ Identify Internet Access Technologies in libraries in Nigeria

§ Mention ICT-Based Library Activities performed in libraries in Nigeria

§ State ICT-Based Library Services offer in libraries in Nigeria

§ Identify Major challenges to the use of ICT in libraries in Nigeria

§ State Strategies for improving the use of ICT in libraries in Nigeria

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Chapter Four

Current Trends and Issues of Automation in Library and Information Resources Dissemination Exercice

[Circulation - Output]

4.1 Chapter Objectives

After reading this chapter readers should be able to:

1. Describe the concept of Library Networking
2. List types of Networks
3. Identify the structure of Internet/Web
4. Give account of online storage and virtual state of accessing information
5. Describe Database Management Systems (DBMS)
6. State types of database systems
7. Enumerate values of database systems
8. Narrate brief history of database systems
9. Express functions of a DBMS
10. Discuss the idea of virtuality in database sharing
11. Outline influences of database system on library management
12. Identify digital resources values & applications
13. Relate digitization developments in Nigeria Libraries
14. Identify new Innovative Delivery Strategies to Digitalized Knowledge
15. Mention social-media tools use in enhancing information delivery and overall library and information management
16. Describe the concept of Web 2.0 / Library 2.0

17. Identify essential elements of Library 2.0 suitable to present day libraries
18. Explain the meaning of 4IR
19. Relate 4IR Technologies with the Libraries
20. State 4IR Potentialities and applicability in the libraries
21. Enumerate Challenges of the 4IR application in the libraries
22. Write Prospects of the application of 4IR technologies in the libraries
23. Explain the Concept of QR codes
24. List the Features of QR Codes
25. Enumerate the merits of QR Codes
26. State the Functions of QR Codes
27. Elucidate steps in using QR Codes
28. List steps in generating a code
29. Explain how to acquire QR Code Readers
30. State the virtues and values of the application of QR code in libraries
31. Itemise the technologies of QR Code in Libraries
32. Explain the need for Quick Response (QR) codes application in Nigeria libraries
33. Describe the Bing-Chatbot
34. Narrate how to use Bing-Chatbot
35. State how to use Bing-Chatbot for Literature Review
36. Draft importance of application of Bing-Chatbot to libraries services
37. Explain Blended learning Concept
38. List the Impacts of Blended Learning
39. Review the use of Blended Learning in academic society
40. Relate key issues in Digital Library Services and Blended Learning Support provision in some tertiary institutions in Nigeria.

4.2 Chapter Introduction

In this chapter readers are introduced to:

- § Library Networkings
- § Network Types
- § The Internet/Web
- § Online Storage & Virtual World
- § Database Management Systems (DBMS)
- § Types & values of database systems
- § Brief history of database systems
- § Functions of a DBMS
- § Virtual world: Database sharing
- § The influence of database system on library management

§ Digitalized Knowledge Management and Delivery: The New Innovative Delivery Strategies in Tune with 21st Century Requirements

§ Digital Resources values & applications

§ Digitization in libraries

§ Digitization Developments in Nigeria Libraries

§ New Innovative Delivery Strategies to Digitalized Knowledge

§ Other new technologies applicable in management and delivering digitalized knowledge in libraries

§ Enhancing Library and Information Management through the Use of Social-Media

§ Social-Media

§ Web 2.0 / Library 2.0

§ Essential elements of Library 2.0 suitable to present day libraries

§ Social media tools

§ Use of social Media tools for Enhancing Information dissemination

§ The concept of 4IR

§ Relations of 4IR Technologies with the Libraries

§ The 4IR Potentialities applicable in the Libraries

§ The Challenges of the 4IR application in the Libraries

§ The Prospects of the application of 4IR technologies in the Libraries

§ The Concept of QR codes

§ The Features of QR Codes

§ The Merits of QR Codes

§ The Functions of QR Codes

§ How to operate QR Codes

§ How to generate a code

§ How to acquire QR Code Readers

§ The virtues and values of the application of QR code in libraries

§ The technologies of QR Code in Libraries

§ The need for Quick Response (QR) codes application in Nigeria libraries

§ The concept of Bing-Chatbot

§ How to use Bing-Chatbot

§ How to use Bing-Chatbot for Literature Review

§ Importance of application of Bing-Chatbot to libraries services

§ The Concept of Blended learning

§ The Impacts of Blended Learning

§ The uses of Blended Learning in academic society

§ Key issues in Digital Library Services and Blended Learning Support provision in some tertiary institutions in Nigeria.

4.3 Library Networking

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HighLights:

- « The concept of Networking
- « Types of Networks
- « The Internet and Web (WWW)
- « The Objectives of Library Networking
- « The Development of Library Networking: An overview
- « Impediments in Developing and Sustaining Library Networks
- « Possible Solutions to the Challenges (Impediments)

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A library network is a connection of group of libraries coming together with the intent of collobration and resources sharing to help satisfying the information needs of their clientele. Rapid development of information and communication technology and wide utilisation brought about information explosion. Consequently, the need to effectively handle exploded information at cost efficiency of infrastructure were some of the motives behind the formation of library Networks. What later follows these, were the development of relationship and professionalism.

The magnanimity of library network on information dissemination can not be quantified. Better method of data/informaton transmission in form of audio, visual, and both forms through the connection of wired and wireless networks are now possible thanks to the application of ICT in information processing and the architecture of Networks. Accordingly, the wireless network has enabled and supported a significant free-flow of information from many sources. There are several types of wireless networks based on the coverage area and distance.

4.3.1 Network Types

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HighLights:

« **Personal Area Network (PAN)**
« **Local Area Network (LAN)**
« **Metropolitan Area Network (MAN)**
« **Wide Area Network (WAN)**
« **International Network (INTERNET)**

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Depending on the physical distance between computer systems and devices on network, networks can be classified as:

1. Personal Area Network (**PAN**): The wireless network that supports the interconnection of computer systems and devices within a range of 33 feet or so, This class of network permit the connection of a laptop, digital camera, and portable printer without having to hardwire anything. A typical example of this is Bluetooth.

2. Local Area Network (**LAN**): The wired network that connect systems and devices within the same geographical area. This class of network permit the connection of resources and activities of two or more departments/units of a library.

3. Metropolitan Area Network (**MAN**): The network that connects systems and devices in a geographical area (roughly 30 miles) larger than the area covered by a LAN but smaller than the area covered by a WAN. This class of network is limited within a city or campus. It permits the connection of two or more libraries especially branch libraries.

4. Wide Area Network (**WAN**): The network that connect together computer systems and devices within large geographical areas or regions. This class of network is

provided by various carriers and service providers for free or service to be paid for.

5. **Inter**national **Net**work (**INTERNET**): The network that connect together computer systems and devices between countries for electronic flow of data across international boundaries. This class of network permits sharing of library and other organisational resources across the world.

4.3.2 The Internet and Web (WWW)

The largest computer network in the world is the Internet. Libraries, colleges, and research businesses have been using the internet for a long time. When using the Internet's power, people and businesses may access a broad range of services. Among these is the WWW. The World Wide Web was intended to be a global online document management system. It arranges global Internet resources into a set of menu pages that show up on your machines. Today, many organizations offer websites (web logs or blogs) where they may plug in activities and resources intended for global access. It is currently the most popular media for use by individuals and organizations to publish and distribute information. Many academics and researchers use the internet to get the most recent information on the subject that interests them.

Finding information online is similar to perusing a library, where the card catalogue is the most common entry point. It would be quite challenging to discover information in the library without the card catalogue. When accessing the internet, search engines—also known as online search tools—replace the card catalog. The majority of search engines, including Yahoo! and Google, are available for free usage. By charging marketers to place banner ads on their search engines, they generate revenue. Even the greatest search engine does not crawl all Internet pages since the web is a massive area and it continues to grow with each passing day. Your search might not be successful even if you locate a site that suits you. Therefore, to increase the number of potentially interesting Online sites, you might wish to use more than one search engine while conducting a web search. Some search engines additionally include a subject dictionary that enables users to learn more about various organizations and sectors. Online services are a set of standards and technologies that streamline and make it easier for websites to communicate with one another. They promise to revolutionize how we create and utilize the web for both professional and personal purposes. Web services are widely used by organizations and libraries to connect services on the Internet. Libraries today share resources and collaborate through library networks.

4.3.3 The Objectives of Library Networking

The main aim of library Networking is for collaboration of activities and resources sharing. In line with this, other objectives scribe by the libraries which which include but not limited to the below:

1. To facilities library operation in resources sharing by way of promoting accuracy and minimising time and cost spent on repetitive operations.

2. To establish pathways for easy exchange of information and documents that relegate distance covered in manual way of doing this.

3. To support and promote adoption of unified standard in operations of the library across the world.

4. to improve service efficiency by redefining and fine-tuning the existing services and generating new ones in satisfying users' information needs.

5. to improve the efficiency of in-house resources preservation and linkage.

6. to create databases of library for online information services.

4.3.4 The Development of Library Networking: An overview

The development of library Networking facilitates library cooperation and resources sharing by several libraries across the globe. According to Tiwari (2014), The Networking efforts in various countries got a boost with the tremendous and fast developments in computer and communication technologies that led to the implementation of successful operation of national and international computer-communication networks. That these networks were commonly used for business and commercial applications, but the libraries were quick to start effort to make use of these networks for linking libraries for resources sharing among them.

The narrative of library networks in developed countries like America, Britain, Chains and many other advanced countries is worthy of hearing. The Washington Library Network and the Research Library Information Network both in America, and the British Library Automated Information Service in Great Britain are few examples of library networks with track record. The success stories of the universal library networks like the Online Computer Library Centre (OCLC) and similitude Online Library of Congress Catalogue are motivational narratives that keep many libraries connected. With the expansion of automation and acceptance of MARC format by more number of libraries, retrospective conversion of existing manual records becomes greater, and this was the button line for library Networking (cooperations and integration of computerised library systems and services worldwide through the Internet). Today, many individual libraries upload their catalogue records done off-line or manually on internet and cooperate in online cataloguing to jointly produce union catalogues, the likes of WorldCat. WorldCat is a union catalogue of libraries of participatory member country.

In Nigeria, many libraries are at infancy level of Networking. Various regulatory bodies of educational instructions have supported networking in their institutions and majority of them are preparing ground for unifying library services across institutions. Nigeria University Commission (NUC) and Tertiary Education Trust Fund (TETFund) are notable bodies that have taken and still taking giant stride in actualising the dream of

library Networking and knowledge sharing in Nigeria. TETFund in particular, is currently supporting creation of databases of tertiary institution libraries' holdings in Nigeria. Efforts now concentrated on conversion linkage of research reports (projects) of graduated students in Nigeria institutions. Eventual completion of this exercise would quite change negative narrative of the use of these resources. It would facilities resources sharing and utilisation, and promotes collaboration among the libraries. Moreover, it would check enormous duplication of research reports (check plagiarism and piracy), increase access base for users and overall improvement in service delivery.

4.3.5 Impediments in Developing and Sustaining Library Networks

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HighLights:

« **Nonchalant attitudes of some libraries/ library staff**

« **Irregular/Insufficient Funding of Libraries**

« **Inadequate Facilities for Networking Exercise**

« **Non effective &efficient software peculiar to library procedures &work in WAN**

« **Inadequate expertise in database development and network management**

« **Nonexistence of Rules and Procedures for Library Networking**

« **Difficulty in Standards Enforcement in data conversion**

« **Reluctance in Change of Input format and procedures if required to join a network**

« **Non Compensating incentives for the use of collections of large libraries**

« **Power Failure & Fluctuation**

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To develop library networks is quite challenging and likewise sustenance. The narrative in developing countries like India is what is obtainable in Nigeria. Moreover, there are additional challenges specific to Nigeria. The following are some of the impediments to the development and sustenance of library networks in Nigeria:

1. **Nonchalant attitudes of some of the libraries/ library staff:** This is a number one impediment to the development of library network particularly in Nigeria. Up to now, some libraries and their staff in Nigeria have refused to stand up for the development of network in their libraries. They have no tangible plans for this. In Nigeria, some institutional libraries are by way compelled to put in place facilities for e-services just to get through accreditation exercise and after this, nothing serious done again even for subscription of data to keep running online services until next accreditation they embark on fire-brigade approach to bring back online services. Although some of the libraries have good track of record. Seriousness in the part of libraries and library staff is what would convince funding bodies to pay attention to the development and sustenance of library network. The staffs of the libraries are to

persuade all stakeholders in library business and to support the development and sustainability of library network in their area.

2. **Nonchalant attitudes of some of the libraries/library staff: Irregular /Insufficient Funding of Libraries:** This factor is reported by many recent researches carried out in Nigeria as among challenges to the provision of e-services in Nigeria libraries. The overall allocation to library services is skeptical and irregular (raises and falls) in most libraries. The government and funding institutions should do the needful in providing regular and sufficient financial support for database creation in libraries and library networks.

3. **Inadequate Facilities for Networking Exercise:** Many libraries are faced with the challenge of enough facilities (hard & software) for participating in networking exercise. The meager resources at their disposal do not catar for acquisition of IT facilities and other needs for joining the network.

4. **Non effective & efficient software peculiar to library procedures & work in WAN connectivity:** Libraries do not have software peculiar to their needs and procedures and that can perform well in a Wide-Area-Network environment. Some of the libraries use CDS/ISIS but prefer to use other software which works more efficiently with large collections and users, and for both types of functions.

5. **Inadequate expertise in database development and network management:** Libraries generally do not have enough staff with adequate knowledge in database development and in the use of network hardware and software.

6. **Nonexistence of Rules and Procedures for Library Networking:** Non existence of rules and procedures in tune with standards for database development and network operation is a bottleneck in the running of library network. In the running of library network, the participating libraries should first draft detailed rules and procedures that are in tune with the existing standards for database development as well as network operation and ensure their implementation by participating libraries.

7. **Difficulty in Standards Enforcement in data conversion:** Difficulty in standards enforcement in data conversion for creating databases of library holdings is a case particularly when different libraries do the job separately. Where input format and procedures alike, variation occur in practices such as depth of indexing and generation of keywords. This can only be checked with unified system of job execution by the participating libraries.

8. **Reluctance in Change of Input format and procedures if it is required to join a network:** In the light of the above i.e. variations in data conversion, input format and procedures, libraries that have already created databases of their holdings fully or partially with their peculiar input format and procedures find it difficult to change them if it is required to join a network due to the cost spent and efforts made in executing the task and another cost and efforts required to change them.

9. **Non Compensating incentives for the use of collections of large libraries:** In a network, it is a fact that collections of large libraries are occasionally overused, thus,

libraries with large collections feel reluctant in participating in networking unless there are compensating incentives to be offered them.

10. **Power Failure & Fluctuation:** This is peculiar to certain part of Nigeria and similar part of the world facing problem of electric supply but not developed states. Entropy of current (electric) that increase and decrease over a given amount of time and outright failure over short or long period of time still persist in some part of Nigeria, and this is a big challenge to the running of e-libraries and network. Although some libraries have made effort in making available alternative source but they sometimes do not incurs the cost of maintenance, as such, also fails in most cases. The only way to keep on network and make services available constantly, is to establish a stable way of power supply.

4.3.6 Possible Solutions to the Challenges (Impediments)

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HighLights:

« **Libraries raise to their expectations in pioneering establishment of library networks**

« **Regular & sufficient Monetary Allocation**

« **Adequate Provision of Facilities for Networking Exercise**

« **Provision of Effective & efficient software peculiar to library procedures & that works in WAN connectivity**

« **Coaching of the existing staff & employement of experts in database development and network management**

« **Establishment of Rules and Procedures for Library Networking**

« **Endurance in Standards Enforcement in data conversion**

« **Willingness to Change Input format and procedures if it is required to join a network**

« **Compensations for the use of collections of large libraries**

« **Source of Stable Power Supply**

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The development and sustenance of library network is easy and interesting if stakeholders are determined to do so. Solution to the problems identified requires serious attention of stakeholders and all hands must be on deck. Moreover, the following possible solutions are suggested inline with impediments earlier itemised and they are:

1. **The staffs of the libraries most rise to their expectations.** They are the frontiers in library activities and number one to set plans for the development of library network in their libraries. To date, some libraries and librarians in Nigeria have refused to stand up for the development of network in their libraries. They have no tangible plans for this. Some institutional libraries are by circumstances ccompelled to put in place facilities for e-services just to get through accreditation exercise and after this,

nothing serious done again even for subscription of data to run online services until next accreditation comes again (and by the way, fast approaching) they embark on fire-brigade approach to put in place services just to get through another accreditation. Although some of the libraries have good track of record. Seriousness in the part of library staff, librarians in particular, and their doggedness to the actualisation of the networking task is what would convince funding bodies to pay attention to the development and sustenance of library network. Library staffs are to seek possible means of convincing the stakeholders in library business and persuad those to support the development and sustenance of library network in their area.

2. **Monetary Allocation of the libraries must be regular & sufficient.** The overall allocation of the library shouldn't be skeptical and irregular; raising and falling. The government and funding institutions should do the needful in providing regular and sufficient financial support for database creation in libraries and for library networking.

3. **Provision of adequate Facilities for Networking Exercise:** Enough facilities (hard & software) for participating in networking exercise should be put in place in libraries. Adequate resources be granted to the libraries and at their disposal so as to catar for acquisition of IT facilities and other needs for joining the network.

4. **Provision of Effective & efficient software peculiar to library procedures & that works in WAN connectivity:** Libraries should possess software peculiar to their needs and procedures and that can perform well in a Wide-Area-Network environment, software that works more efficiently with large collections and users, and for both types of functions.

5. **Coaching of the existing staff or/and employement of experts in database development and network management:** Libraries generally should have enough staff with adequate knowledge in database development and in the use of network hardware and software; this is a prerequisite in the task of library networking.

6. **Establishment of Rules and Procedures for Library Networking:** Non existence of rules and procedures in tune with standards for database development and network operation is a bottleneck in the running of library network. In the running of library network, the participating libraries should first draft detailed rules and procedures that are in tune with the existing standards for database development as well as network operation and ensure their implementation by participating libraries.

7. **Endurance in Standards Enforcement in data conversion:** Difficulty face in standards enforcement in data conversion for creating databases of library holdings should be endure especially when different libraries do the job separately. Input format and procedures as well as in-practices such as depth of indexing and generation of keywords must be the same, and can only be checked by unified system of job execution by the participating libraries.

8. **Willingness to Change Input format and procedures if it is required to join a network:** In the light of variations in data conversion, input format and procedures,

libraries that have already created databases of their holdings fully or partially with their peculiar input format and procedures should be willing to change them if it is required to join a network and ignore the cost spent and efforts made in executing the task, and incurred another cost and efforts require to change them.

9. **Compensations for the use of collections of large libraries:** Provision of compensating incentives for the use of collections of large libraries could motivate libraries with large collections to participate in library networking.

10. **Source of Stable Power Supply:** Entropy of electric current and power failure should be avoided in libraries as this poses threats to the running of e-libraries and network. Although some libraries have made effort in making available alternative source but they sometimes do not incur the cost of maintenance, as such, it also fails in most cases. The only way to keep on network and make services available constantly, is to establish a stable source of power supply. Many reliable sources abound and could be deployed. One of these is 'renewable energy' which is cheaper, safer, and more reliable than other sources. Libraries should look forward in adopting renewable energy as major source of power supply to the libraries because it is user-friendly. Renewable energy unlike generators, generate no sound, vibration and smoke that disturb users of libraries.

4.4 Online Storage and Virtual World

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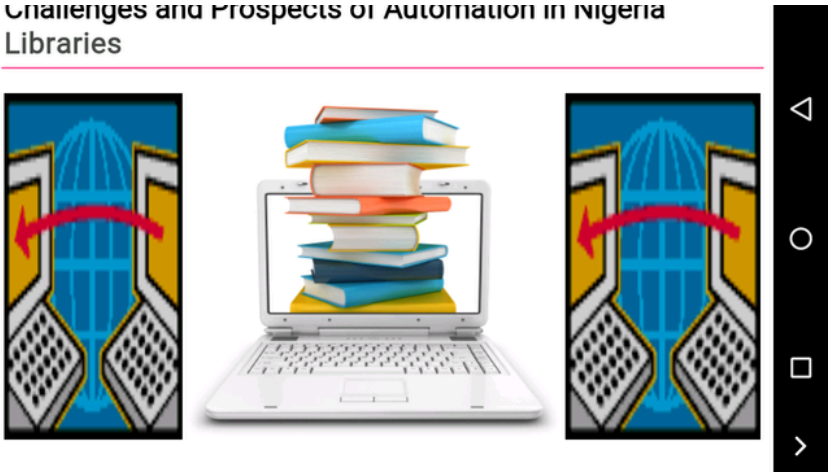

HighLights:

- « **Database Management Systems (DBMS)**
- « **A brief history of database systems**
- « **Functions of a DBMS**
- « **Database sharing: A Virtual world**

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4.4.1 Database Management Systems (DBMS)

Synonymous with automated libraries reservoirs is database management system which permits resources sharing similar to what happens in the libraries. Database Management Systems (DBMS) is gaining acceptability in many organisations as better means of storing data/information. In the earliest days of computer technology, data were stored on devices such as punch cards, slides, tapes, that could only be accessed by a particular person at a time on a fixed location. But with the development of DBMS early sixties, data communication capabilities to large number of seekers were achieved. ***A database management system is a group of tools that let users define a database's structure, add, query, and alter data in the database, as well as manage who has access to it*** (Ward and Dafoulas, 2006). In a nutshell, it is computer software created to manage the organization, security, integrity, storage, retrieval, and reporting of data in a database, which is a sizable searchable file. With the help of database management system software, a database is manipulated.

A database is a sizable volume of digital information about a single subject or field that is correctly organized, updated often, and searched and retrieved quickly. Databank and database are occasionally used interchangeably. However, the latter phrase is more explicitly used to refer to a set of nonbibliographic data, often quantitative and personal information. Databases may be accessed and viewed online and can take the shape of numbers, text, letters, or images. It is a repository of information that includes bibliographic records, abstracts, full-text articles, directory entries, photos, statistics, etc. It often refers to a particular body of knowledge set organized to make it easier to access, update, process, and transmit. Data Document Initiative (DDI), available at www.icpsr.umich.edu/ddi, is an example of a database. The goal of this project is to standardize the XML markup and representation of codebooks, the main metadata used to describe social science data sets. Simple systems made for personal computers and extremely complicated systems made for mainframes are both included in the range of DBMS software that is now available. Database management systems (DBMS) employ application software to access, modify, and edit data. It has the ability to receive and reply to requests from end users. Most corporate organizations, including banks, businesses, and NGOs, maintain databases to store and alter their records and communicate with potential customers. So, a variety of databases may be used to access information or expertise about a certain group or topic area. Today, technology has

made it easier to conduct research and get the data to the end customers. When it comes to consistency, efficiency, security, adaptability, dependability, and accessibility to data, a database system has an advantage over alternative methods of data storage. It can prohibit unauthorized individuals from accessing or altering the database, and it provides benefits comparable to those listed for library automation.

4.4.2 A Brief History of Database Systems

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HighLights:

« **Concept of database systems started in the early 1960s**

« **By the 1970s the study of database systems acquired a huge interest, thus relational model suggested in 1970**

« **The first relational commercial solution Oracle DBMS debuted on the market in 1980**

« **Inplace of of Oracle DBMS, object-oriented databases gain popularity in the 1990s.**

« **The first databases that could be accessed over the World Wide Web started in the middle of the 1990s**

« **Up to this day, databases supporting websites continue to develop quickly**

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With the introduction of an IBM product in the early 1960s, the concept of database systems started to take shape. With this system, users had the option of seeing digitized data hierarchically. Database systems based on a distinct data module were introduced in the late 1960s thanks to advancement. This time the user view of the data was a network of data records, an ability of accessing data concurrently by various users. By the 1970s the study of database systems acquired a huge interest of academics and researchers. As a result, Ted Codd originally suggested the relational model in 1970. It was based on the mathematical ideas of set theory and predicate logic. The Oracle DBMS, which debuted on the market in 1980, was the first relational commercial solution. This has been successfully utilized to handle transactions and support the majority of the widely used database systems today. It is a useful model due to its capacity for handling data well, safeguarding data from programming mistakes, and, most importantly, its potent query language. Although relational databases are commonly used, they do have a few flaws that caused object-oriented databases to gain popularity in the 1990s. In the middle of the 1990s, the first databases that could be accessed over the World Wide Web started to develop because these databases were effective with applications that required increasingly complicated data structures. Due to its tremendous capabilities, this notion gained traction by the late 1990s, and up to this day, databases supporting websites continue to develop quickly.

4.4.3 Functions of a DBMS

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HighLights:

« **Data definition & communication**
« **Data manipulation**
« **Concurrency management**
« **Buffer management**
« **Query processing and optimisation**
« **Data Recovery**
« **Security Management that controls access to base**
« **Data dictionary mechanism for storing meta-data about data held**
« **Integrity constrictions and authorisation**

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Because of certain procedures built into it, a typical DBMS may perform a variety of tasks. Among them, but not exclusively, are some of the following:

1. A data definition language (DDL) that enables users to define databases and communicate with system administrators.

2. A data manipulation language (DML) that enables database users to add, amend, remove, and query data

3. A concurrency management system that permits secure concurrent execution of several transactions, allowing for shared database access. Multiprogramming, a method that enables the computer to run numerous programs simultaneously, makes this feasible.

4. A buffer management system for moving data back and forth between primary memory and secondary storage.

5. A Query processing and optimisation mechanism which transforms SQL queries into a low-level language that the database administrators have optimized. This system chooses the best method for executing a query in any DBMS.

6. A Data Recovery Tool that guarantees the consistency of the DBMS in the event of a database failure. The primary method employed here is database backup, in which the whole database as well as the log are routinely transferred onto a storage media, such magnetic tapes, which can be reloaded to the disk and the system restarted.

7. A Security Management Technique that limits access to the database by preventing unauthorized users from using it. When a database is changed, a data integrity facility ensures its integrity (i.e., accuracy and consistency).

8. A Data dictionary mechanism which is a repository for storing meta-data about data held. This usually includes details of the data items held. Also, structure, integrity constrictions and authorisation privileges attached to them.

4.4.4 Database sharing: A Virtual world

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HighLights:

« Database shared around an organization or the whole world via networks

« Possibility for geographically dispersed work groups to communicate and share documents

« Networking has been fora for database creation, preservation, manipulation, and dissemination

« More libraries are connecting their computers in networks to expedite operations, enable staff collaboration on library projects, and transmit and receive information

« A library may become a flexible, strong, and innovative organization with the creation of database and use of networks to share information

« Arround the world, wherever one is, databases of different libraries are tapped without been in different locations of the libraries

« Life of virtual presence in actualising needs; life of virtuality and Virtual World.

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Databases may be shared around an organization or the whole world via networks. A computer network has made it possible for geographically dispersed work groups to communicate and share documents, promoting collaboration, creative thinking, and new business approaches. A computer network consists of the hardware, software, and communications medium required linking two or more computer systems or devices. They can exchange data, information, and tasks once they are connected. This is the fora of database creation, preservation, manipulation, and dissemination. In order to increase organizational effectiveness and efficiency, more libraries are connecting their computers in networks to expedite operations, enable staff collaboration on library projects, and transmit and receive information. A library may become a flexible, strong, and innovative organization with the creation of database and use of networks to share information, giving it a sustained competitive edge. Arround the world, wherever one is, databases of different libraries are tapped without been in different locations of the libraries. And this is the change brought by networking that have affected nearly all human endeavors not information seeking alone. Life of virtual presence in actualising needs without necessarily been where needs are but drawn them to meet you where you are; life of virtuality and Virtual World.

4.4.5 The influence of database system on library management

The institutionalization of database system has facilitated the process of acquiring library materials. Librarians now are able to scout for materials from the net and even requested some for free or for a token through e-transactions. Recall that the requirement to swiftly and reliably retrieve vast volumes of data from databases drove the creation of database management systems. For example, a university library usually has large number of collection and provides details about this in a library catalogue which formerly was only accessed manually. Eventually, DBMS are applied to this process (cataloguing) which has now facilitated the process and accessing of the details provided through online. More importantly, the database catalogues or OPAC can be accessed by many users simultaneously in different locations. The majority of databases used by libraries are full-text reference materials, periodicals, indexes, abstracting services, and catalogues that are rented on a yearly basis under license agreements that only allow authorized users and library personnel access. This enhancement has given library users the chance to modify queries and access their demands. Excellent DBMS features that allow for speedy answers to user queries include data dictionaries, query processing and optimization, and data definition and manipulation languages.

Another important aspect of the library is charging and discharging of library materials. Libraries store details of books held and those taken out on loans by patrons. Before now, details about books held and loaned out might have been stored in a box card index. But nowadays, DBMS are applied to this, making such details available online. Thus, from database, patrons are able to check to see if a book is available and can also request for it. They are also able to view their loans online and see if any books are overdue. Similarly, the library staff can easily and quickly access statistics of books loaned out to see those books overdue so as to send message to the borrowers and to retrieve them back immediately. Through this system, they are also able to recognize popular books seek by users and which never leave the shelves; an important information that guides subsequent collections.

Furthermore, with the development of database system and shift of libraries to it, the security of library materials are exhaustively granted. The DBMS have proved this through its magnificent functions of **data integrity**, **recovery**, and **security control** discussed previously.

4.5 Digitalized Knowledge Management and Delivery: The New Innovative Delivery Strategies in Tune with 21st Century Requirements

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HighLights:

« **Introduction & the concepts**

« **Digital Resources: Values and Application in Libraries**

« **Developments in Digitization & Situation in Nigeria Libraries**

« **New Innovative Strategies to Digitalized Knowledge Management & Delivery in tune with 21st Century Requirements**

« **Conclusion & Recommendations**

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This segment is a shared initiatives of article written by the author of this book to unveiled new innovative delivery strategies to digital knowledge in tune with 21st century requirements that there acquaintance by knowledge managers and application in digital knowledge delivery would Improve professional competence of knowledge managers/librarians particularly working in academic libraries. These includes creative use of social media platforms (yutube, instagram, whatsapp, facebook, linkedIn, twitter, reddit, etc), quantum-computing, edge-computting, 3D-printing tech, 5G-tech, AI-tech, block-chain tech, and drone technologies. Others includes streaming media (podcasting), instant messaging (SMS enquiry), wikies & blogs, vodcasting, author workshops (Institutional repository), Geo tagging, and online chats - the use of web conferencing tools (zoom, go-to-meeting, click-meeting, google-hangout, demio, webinarian etc. Digital resources values and application in libraries and, developments of digitization in Nigeria libraries also highlighted. The prompt allocation of adequate funds to libraries, particularly academic libraries, for the exploitation of new innovations contained therein, training and retraining of librarians for the twenty-first century, and personal efforts by librarians to enhance their skills in order to remain competent and defend their profession in and beyond the twenty-first century were all recommended.

4.5.1 Introduction

This article is as a result of challenge thrown to stakeholders in education on the 27th combined convocation ceremony of the Niger state college of education, Minna by the visitor and the governor of Niger state His Excellency Alh. (DR.) Abubakar Sani Bello, who on his speech says:

"We all know that the 21st Century is the age of innovation and rapid change which call on us particularly as teachers to begin to research into ways of improving the professional competence and fund new innovative delivery strategies in tune with 21st century requirements."

Teachers and librarians are two related professions with common goal all toward knowledge delivery, and are among major stakeholders in education. If the need to research for ways of improving the professional competence of teachers and to fund new innovative delivery strategies for the profession, likewise the need for librarians to begin to research into ways of improving the professional competence and to fund new innovative delivery strategies. Relatedly, Zakari (2000) earlier precast that 'the application of more advanced IT facilities will certainly create a high degree of information glut and a perpetuation of the information and perhaps literature explosion syndrome in the 21st century. And that, the need for quicker access to the maze of information might force libraries and information centres to compete with private and commercial information providers to make any meaningful impact on the society they are meant to serve. Sagir (2021) in relation to this said libraries of 21st century would depend on digital technology for information service delivery. And that, in the twenty-first century, librarians are no longer merely the keepers of books; they are also information providers in a setting where the use of digital technology to deliver information services results in ongoing change. It's interesting to note that libraries in Nigeria, and academic libraries in particular, are actively searching for and launching new innovative delivery strategies in line with 21st century requirements, which primarily center on digitization and use of cutting-edge technologies, and competing with private and commercial information providers.

Academic libraries are libraries of tertiary institutions; colleges of education, mono/polytechnics, universities, research institutes and the likes. Knowledge digitization and other innovative delivery strategies in tune with 21st century requirement are keys to supporting learning, research and teaching in these institutions of higher learning. Digitization is a new way of managing knowledge. Knowledge management is an exercise that revolves round collection, organization, preservation, and dissemination of documented knowledge. A process describes as input, processing and out in other way. According to Enagi (2019) knowlege is what one know and have in his brain memory...but if transfer to external memories other than brain it becomes

documented knowledge. This is the type of knowledge kept by libraries and sister agencies. However, the meaning of knowledge has change.

The development and collection of a vast amount of information has resulted from man's pursuit of knowledge. Today's globe prides itself on being a knowledge-based civilization (CHIGOZIE S. UGWUONA, 2021). The information millennium is the twenty-first century. It is also seen as the age of a boom in information sources and output. It is regarded as the start of the knowledge era. As a result, new types of work with new and varied abilities are needed, as well as new patterns of labor and business processes. Workers must be able to discover, evaluate, and represent new information rapidly in the knowledge era. They must be flexible, inventive, and creative as well as have systemic thinking skills. This is what digitization means.

Data conversion to digital format for computer processing is known as digitization (Reitz, 2005). In information systems, it's typically described as the process of converting printed text or graphics (such as drawings) into binary signals so they may be shown on a computer screen. Knowledge digitization simply refers to the use of cutting-edge information technology to document knowledge as opposed to traditional print systems. The search for or use of knowledge or information is one area of human effort where digitization is a driver for innovation and development. Presently, in the library and virtually all information cycles, digitization is a term use in place of automation. While automation is a general term used to describe the use of all forms of machines (computers and non-computers) in accomplishing a task, digitization specifically speaks of the use of latest information technologies (computers and the likes) in perfecting operation. In the business of the library, Saeed (2019) said digitization is the use of latest information technologies (computers and accessories) in perfecting range of operations from information acquisition to processing and dissemination.

The library is a typical information providing system which is positioned to aid the institution located in the actualization of its objectives through the provision of relevant information materials (Abel and Shittu, 2019). Prior to the advent of ICT, information in libraries were packaged in predominantly print form. The present development in computer technology brought about new packaging format – the digital format, which has brought a lot of progress to knowledge management though also with few challenges (Anyanwu and Dudu, 2018). Many libraries, including Nigeria libraries, are now linked up locally and internationally using ICT facilities all geared toward providing timely and cost-effective information and elimination of information explosion and fragmentation.

Nigeria is one of the biggest countries in Africa. Precisely, it is in West-Africa sub-region with a population of over two hundred million people. The utilisation of ICT by this mass population perhaps exposed it to be one of the largest utilization of ICT in the sub-region and Africa as a whole as reported by Ndagi (2019). Similarly, the same report has it that academic libraries in Nigeria are lead deployers of digital resources and cutting-edge technologies in satisfying users' quests. Against this background this study was conceived with the main purpose of, by way of literature study and review, research

into ways of improving professional competence of knowledge managers (librarians) and found new innovative delivery strategies to digital knowledge in tune with 21st century requirements for academic libraries in Nigeria.

4.5.2 Digital Resources: Values and Application in Libraries

The emergency of multi-media, automated information packaging and transmission as well as the Internet has consequently reduced reliance on traditional library methods of information gathering, storage, processing, retrieval and dissemination (Zakari, 2000). Both libraries and information technology firms throughout the world are putting up a struggle for relevance in the digital arena. Particularly libraries continue to roll out digital services and products that are made for the internet community and make it easier to get pertinent information. This is how the area of digital libraries has developed (Saeed, 2019). With regard to time and location convenience, the ability to search directly inside the text as opposed to catalog data, and the capacity to distribute and exchange information internationally, digital resources provide a number of benefits. The greatest benefit of using digital resources, according to Ashaver and Ekere (2013), is the information's quick accessibility. And that, with digital resources, the user is always availing with a variety of formats, including PDFs, word and HTML. Digital resources are clean and free of dust and mildew sometimes associated with books on the shelves of the conventional library formats (Anyanwu and Dudu, 2018). Reading through digital resources will never cause sneezing nor leave an ink stain on the hands of researcher (Ashaver and Ekere, 2013). On advantages of digital resources, Ogwuona (2021) stressed that 'with ICT users are now able to access the libraries without being present in the library wall, and circulation services rendered to users without them being present in the library and could access the best materials online. Also, current awareness services could be provided directly to users e-mails for them to know newly acquired information and materials. Acquisition and documentation of new materials also handled directly with distributors from all over the world. The online process came in and has saved time and cost for the library. Ogwuona add that documentation of library materials is now easier and software are developed to make it so much easier for the librarian and has also improved efficiency and use of time. That, library software are readily available such KOHA, UNISIS, ALICE et cetera, which ease library operations and service delivery.

According to Varshnavi (2017), the web's (digital resources) potent properties, such as its heterogeneous, collaborative, multi-media, and potent protocols and architecture, have given librarians a new dynamic role to play in society and better serve the new information based than ever before. That the internet, which houses online resources, has completely changed how individuals access knowledge and created new opportunities in fields like digital libraries According to Roy (2020), a "digital library" is an online platform where users may access traditional library activities and

programs that were previously only accessible when they were physically present at a library. It is the digitalization of tasks including resource gathering, management, preservation, retrieval, serving, transfer, and general resource manipulation in libraries. Digital libraries involve the digitization of all programs and activities carried out by libraries and their users, in contrast to online databases systems, which primarily concentrate on distant information deposits, transfers, and basic online administration of information (Muhammad, 2019).

However, the research by Roy (2020) demonstrated the fast usage of ICT in the last years for the collection, preservation, and distribution of information with particular attention to digitalization in university libraries in South Africa. This trend has caused timely resources to be taken off the shelf and posted online (i.e. online). As a result, technology has allowed users to access numerous services without human interaction and shifted librarians' responsibilities from that of intermediaries to those of facilitators and enablers. It has recently been relocated as an Online Public Access Catalogue (OPAC), making it possible to access more information quickly and conveniently using one or more search criteria. The library catalogue, which is possibly the most important tool for accessing materials in the library, was previously located in a different location (keywords, author, title, class or standard number).

4.5.3 Developments in Digitization & situation in Nigeria Libraries:

It's astonishing how quickly Nigerian libraries are becoming digital. There is no denying that the Nigerian library sector has developed through time, evolving from the antiquated, manual, over-the-counter information searching method to a more advanced, technologically-driven information distribution system (Saeed, 2019). At the past, a particular demand in the library might not have been satisfied for days or perhaps longer. Except in rare circumstances, waiting in line to browse a particular library item after picking up a borrower's card in the library hall or at the circulation counter is no longer an option. The days of traveling a long distance to use a certain library's resources or just being able to borrow a certain quantity of printed volumes for personal use are now a distant memory. Because customers may now relax comfortably inside a digital library, it has reduced travel time to libraries, saved lives that might have been lost as a result of terrible roads and attacks, and introduced privacy, their domain to use materials of the libraries connected with. From the traditional roles of charging and discharging, some libraries in Nigeria have become a one-stop-shop where information seeking for everything is established from one's end (domain) without stepping out and irrespective of the time (Muhammad, 2019). This digital achievement has kicked out limitation of time occasioned by conventional libraries' service hours of 8:00am – 10:00 pm, and total closure durring weekends and public-holidays in Nigeria. In digital libraries services are available 2-4-7, i.e., twenty four hours every seven days of the week.

Nigeria libraries have continued to thrive towards being relevant in a more digital world, especially as more and more libraries opened up library activities to information technology. All most all libraries in Nigeria with specific regards to academic libraries, are taking steps to boost the utilization of internet and digital library system to reach out patrons. Muhammad and Bida (2019) of the view that, the effort of digitization of functions and services in Nigeria libraries is a step at achieving functional dissemination of information, and users inclusion in activities of the libraries. Some libraries in Nigeria have engaged the use of RDA (Resources Description and Access) as a solution to difficulties faced while using manual catalogues for seeking library resources. Haroon (2019) said it is a credit for Nigerian libraries the acceptability and application of RDA, one of the innovations in digital library industry that allow easy and quick access to a particular information resource needed in the library. Credit most also be giving to some of Nigerian libraries for introducing user's specific password for accessing library resources, thereby removing the borrowers cards that were prone to fraud and displacement. Some academic libraries of universities in Nigeria, particuraly of new generation private universities, have introduced user's password for accessing e-resources possess by them. These libraries have always been at the vanguard of presenting users with most current and most relevant materials, making them to be on the path of achieving global best practices in digital applications. Some of these libraries have been seen integrating online catalogue and chatbots among other digital channels towards serving their clients. Some of them have also adopted Whatsapp, an instant messaging application with chat reference enabler as a means of online interface with clienteles. This medium has been used to offer reference services that allow clients to make enquiry or established their needs within short period of time without leaving the messaging app. The findings of the study of Nkeiru Emezie () described how Federal University of Technology, Owerre benefited from these novel services and practices (FUTO library). The results demonstrate how new techniques and services have improved the way services are delivered in libraries. As a result, more people are using the library and using the OPAC to access databases and e-resources. Ndagi (2021) emphasized that many libraries in Nigeria have not yet introduced Whatsapp reference services or other cutting-edge technology to take use of their advantages. Jebba (2019) emphasized that academic liberators in Nigerian institutions of education are particularly at a turning point in terms of digitalization and the use of ICTs for service delivery. That Nigerian college students today use more internet resources to complete academic tasks including completing assignments, supplementing lecture notes, studying for tests and exams, and preparing for seminars, tutorials, and debates. That throughout the 2000s, quick developments in the use of digital technology in educational institutions gave campus researchers and students a lot of alternatives and forced libraries to compete fiercely with search engines like Google and Alfa vista. In fact, the recent Google forays into scholarly contents and mass digitalization have blurred the already hazy distinctions between libraries and commercial services, sending ripples of

panic to libraries and librarians who fail to look for new ways to improve professional competence and fund new innovative delivery strategies in tune with 21st century requirements.

4.5.4 New Innovative Strategies to Digitalized Knowledge Management and Delivery in tune with 21st Century Requirements

Effort here was made to review some of the cutting-edge technologies to be used as strategies in digital knowledge delivery in tune with 21st Century Requirements.

The internet is a fundamental technology for the growth of information technology. According to Lutu (2020), the Internet is a world without boundaries that has developed into a crucial instrument needed by the knowledge-based society to show and handle modern information. Millions of individuals use the internet as a platform for the creation and exchange of knowledge, particularly in an academic setting. Sazili, Moh'd (2017) Ranganathan is of the opinion that the Library, as the center for information dissemination, must adapt IT solutions to its daily operations through the web, electronic network, in which content is transferred via the Internet, intranet extranet, audio/video tapes, satellite television CD-ROMs, DVDs, MP3, etc. Every application or platform to be reviewed all trail on the path of internet for their application. Cell phones and other mobile gadgets have improved communication and advanced the creation, delivery, and access of information. In accordance with Lwhiwhu, Ruteyan, and Eghwubare (2010), modern librarians may deliver efficient library services using GSM-enabled mobile phones (Global Systems for Mobile Communication). That SMS (Short Message Services) may be used to respond to reference requests, notify users of new arrivals, and announce future activities at the institution in support of teaching and research. This might be sent out using a feature called "broadcast," which sends a single text message to all of the library contacts stored in the mobile phone's address book at once.

Social media: A social media platform is a channel via which audio, visual, video, and message files are broadcast to the public at large or to a specific audience. The library has been in the information-connection business. connects clients with their requirements by utilizing a social media network built on Web 2.0 technology. This change has given library personnel additional responsibilities. According to Kamba (2021), Web 2.0 tools, also known as social media, like Facebook, Twitter, blogs, and online groups have made it possible for people to actually connect with one another online. Social media gives you more opportunities to connect with your community, reach out to niche markets, and invite people to engage with your library. Utilizing social media, libraries may interact with their patrons on relevant problems and invite their feedback, especially when it pertains to library services (Khan and Bhatti, 2012).

YouTube, Instagram, WhatsApp, Facebook, LinkedIn, Twitter, and Reddit are just a few examples of well-known social media sites that might be investigated for inventive ideas in the delivery of successful library services, according to Kamba (2021). In a similar vein, Oshile (2021) listed examples of social media platforms for delivery of library services, such as WhatsApp, Facebook, Instagram, Twitter, You Tube, Reddit, LinkedIn, SnapChat, and Flickr.

4.5.4.1. WhatsApp

Users of this instant messaging app for Android-based smartphones and mobile phones may freely send each other text messages, photos, videos, and other file types. Additionally, it permits the attachment of documents in various formats, including Word, Excel, and PDF. WhatsApp may be used in libraries to inform users of upcoming events and to offer services that don't require physical library visits, including Use the Ask the Librarian chat room to engage with library patrons in online forums and to get input on how to make the services more user-friendly. Additionally, notable professional services like newspaper clippings can be offered through WhatsApp, Current Awareness Service (CAS), Selective Dissemination of Information (SDI), and Electronic Document Delivery System (EDDS). It can also be used in facilitating, book procurement, reading/study circle, libray orientation and library bulletin.

4.5.4.2. FACEBOOK

Users may register and make profiles on this social networking platform, which is free to use. It enables sending of messages, keeping in touch with people, and uploading of movies and photographs. Availability of a library on facebbok will able library to communicate with the users effeciently because a library's facebook page is an effective tool for reaching out to its customers. A library can use Facebook to post updates, offer an information literacy program or orientation, connect users to new and existing resources, inform them of the library's programs and services, invite them to training sessions, and encourage user interaction by encouraging comments on posts and sharing with others. Additionally, a library can use Facebook to set up online study groups for users.

4.5.4.3. ISTAGRAM

This is an online photo-sharing service. It allows users to edit and upload pictures and short videos through a mobile app. The use of the Instagram App in a library should be through visual content to allow library users know what the library is all about. A library can use Instagram to share library space give library users an inviting glance into the spaces they have access to. provide a sneak peak, share a sneak peak about the library's latest release, new resource, new program or an upcoming event. This will leave library users anxious and curious to see the real deal. Libraries can use Instagram to repost patron's post. This is a perfect way of engaging patrons and making them to feel a part of library community. This makes the bond and loyalty between the library and patrons run deep. It can also be used to show off photos, videos and interesting captions of library structures, facilities and materials. Instagram stories allow sharing of videos

and photos that will display only for 24 hours. This will keep library users glued to your page because there will always be something new to see.

4.5.4.4 YOUTUBE

YouTube is a social networking site and online video sharing service. Videos of events, seminars, special speeches, etc. are frequently shared through this method. Users may submit videos, post comments, and make playlists on YouTube channels. For the benefit of the patrons, the library can upload movies on YouTube on conferences, workshops, library events, library tours, and bibliographic training. Additionally, it may be used to save movies on topics that interest users, compile them into playlists, and distribute them to other users. It can also be used to distribute films that demonstrate how to utilize the library's many services.

4.5.4.5. TWITTER

Users of Twitter, a free social networking microblogging site, may publish brief messages known as tweets. Using a variety of platforms and devices, users may broadcast tweets and follow the tweets of other users. Library Twitter may be used to disseminate information about events and activities at the library, new arrivals, images of the staff and library's physical spaces, entertainment for visitors, responses to complaints about the library, and connections to other resources.

However, other advanced but applicable technologies in delivering dital knowledge in the library enumerated by Owuona (2021) are quantum-computing, edge-computting, 3D-printing tech, 5G-tech, AI-tech, block-chain tech, and drone technologies.

4.5.4.6. Quantum Computing

This is a computing library programme presently designed to provide ease of use and efficiency in service delivery. Libraries could adopt the use of quantum computing to save and protect data, and for bibliographic services because it works faster than classical computer.

4.5.4.7. Edge Computing

This is a combination of different technologies including grid computing, cloud computing and internet of things (IOTs). This technology brings the internet closer to users, and requires less time and bandwidth to recieve, process and stores data. It has capacity to stores data that is too large to be stored on network and transmits it on cloud computing. It provides data base collection and search solutions.

4.5.4.8. 3D Printing Tech

This new output tool turns digital information into tangible items. As a new technology, 3D printing has attracted a lot of interest as a quick prototype and small-scale production tool. According to Sawed (2021), 3D printing technology has been steadily included into library services to facilitate patron interaction with software contents. While according to Owuona (2021) 3D printing is important in libraries because it allow freedom of expression of ideas by users and gives users the chance to make prototype parts for engineering, IT projects, face shields or pendant images or could sign up for a 3D scanning or sculpting workshop. 3D printing in

libraries is to help users learn the technology and potential of digital fabrications, and re-enforce users learning with simple hands-on projects.

4.5.4.9. 5G TECH

The term 5G is used to describe the 5th Generation cellular communication technology. This speaks of networks standards for broadband cellular networks whose deployment commenced in 2019. 5G is a successor to 4G networks that succeeded 3G, 2G and 1G network respectively. Each new generation surfaces in an interval ten years. 5G is linked with big data, internet of things, broadband and mobile communication. 5G is the fastest network for now and it has much lower latency, higher bandwidth, greater device density, longer battery life for nodes and greater network flexibility.

According to Pantami (2022) 5G goes beyond vjust being a new generation of technologies, rather it represents an era where connectivity becomes flexible and user-cntric. And that it is expected to cover a third of the human population by 2025. That 5G is currently being deployed in a wide range of industries, including health care, banking and finance, automotive, logistics, precision agriculture and transportation among others. Libraries as centres of information business shouldn't be left out. In fact, they need to lead the way. Libraries need to adopt this network to stay useful to their users in terms of providing fast information to the users. Some libraries across the world have started using 5G networks to serve better their users. It can provide the fastest e-library resources for students (Owuona, 2021).

4.5.4.10. AI TECH

Artificial Intelligence technology is a computer technology that deploy machines to do intelligent exercises man does with high capability and proflciency, the ability to think, learn fact and skills to be able to apply them. Similarly, Pantami (2020) said "Artificial Intelligence (AI) is the ability of machines to perform tasks normally requiring human intelligence. Specifically, AI machine attempt to replicate the cognitive ability of humans. However, the human has to start by programming the machine, so it solves future problems by learning from past patterns. "

The ability to develop intelligent computer that perceive, think and behave like humans is the crux of artificial intelligence. Most of our computers and phones today have artificial intelligence features such as speech recognition, language processing, work schedule and automatic performance. In advanced level, AI-Robotic system performs suffisticated tasks such as washing, servicing and driving of cars, delivery of messages and goods, etc. In the library, this can be deploy in shelves reading, arrangement of books, anwsering queries and delivery of services 2-4-7.

4.5.4.12. Block Chain Tech

Block chain is a digital distributed ledger or record keeping side of a transaction and subsequent transactions. It records the date, time, participants and any other contractual agreement in transactions. Information stored as part of transaction cannot be modified unless agreed by both parties. Thus, Casino, Dasaklis & Patsakis (2018) said it provide a secure uneditable record of time-stamped digital transaction. It involves the storing of

information in a distributed, tamper - resistant setting. One good thing a out blockchain is that it is a distributed database which means there are duplicate records in multiple computers, each acting as a node on the network. This and other good things about blockchain spelled out by Pantami (2022) as advantages of blockchain are:

(i) **Immutability:** Records are stored permanently and cannot be altered,

(ii) Trust: The infrastructure gives users trust in the system,

(iii) Disintermediation: This reduces bureaucracy since there is no need circa central controlling authority,

(iv) Self-sovereignty: Users can identify themselves and control their data, and

(v) Transparency: Transactions can be readily scrutinized

Blockchain is like building a trustworthy system in an untrustworthy world (De Filippo & Lavayssirere,2020). According to Pantami (2022) blockchain technology can be deployed in several applications. That as an example, it can ensure the integrity of data, supply chains, certificates and communication, amongst other things. Interestingly, librarians as information preservation tycoons can put into use blockchain system to better their operations. In the Libraries, the block chain could serve as another Digital Right Management (DRM) to print copies because it protects digital first sale rights. With block chain, libraries could have access to information and also have right to protect their information from being plagiarized.

4.5.4.13 Drone Tech

Drones or Unmaimed Arial Vehicles (UAV), according to Owuona (2021) were first used for military operations but other companies have started using it in delivering of parcels to their customer for commercial purposes. That this is an emerging technology that could be used in libraries for document delivery. Drones are controlled by remote ground control system referred to as a ground cockpit. It could be used for delivery of documents, transportation of books to designated areas because they have anchor to carry books and can save time and effort in doing this.

Moreover, other emerging innovations in the 21st century made possible through the changes brought by ICT and should be used by the libraries in reaching out to the patrons include; streaming media (podcasting), instant messaging (SMS enquiry service), wikies & Blogs (social networking), vodcasting (application programming interface (API), author workshops (Institutional repository), Geo tagging (cloud computing), online chats -Ask the Librarian (web conferencing), subject Gateways (content Management systems), library Security systems (smartcards, Biometrics, Face recognition). In addaition to these, libraries/librarians could also deploy latest tools for online conferencing for learning development, capacity building, interaction with proffesional colleagues, library stakeholders and patrons far away from the library. Consequently, Daniel (2021) stressed that there is a seeming live interactivity, synchronicity, collaboration closer to audience working with as a team in the face-to-face meeting, yet without travelling from your station as you can see and hear others, using audio/video features and add notes to a virtual flipchart to show others a

document from word processor and communicating it in real time dynamics. Social-media platforms are used to actulised this, examples which includes:

4.5.4.14. Zoom

This is a straightforward online platform used for virtual conferences and meetings. Zoom, according to Daniel (2021), unifies group chat, basic online meetings, and cloud video conferencing onto a single, user-friendly platform. Today, a lot of libraries and librarians are seeking for chances to practice using zoom. The Niger State Chapter of the Nigeria Library Association (NLA) has done well in this area. It recently arranged a full-fledged course on effective zoom usage for its members and colleagues. Ease of Use:

4.5.4.15. Go-To-Meeting

This webinar solution enables a sizable number of simultaneous participants and is comparatively simple to use. Libraries and librarians might utilize Go-To-Meeting, a long-established program for virtual meetings among experts in many professions, for meetings and business dealings.

4.5.4.16. Any-Meeting

For small user groups or coaching organizations, AnyMeeting is a straightforward web conferencing tool for business meetings, interactions, and educational reasons. This platform is user-friendly, dependable, and offers customer support. This can be used by management teams of two or more libraries to hold meetings for sharing ideas or pursuing common interest beneficial to their libraries.

4.5.4.17. ClickMeeting

This is similar to Go-To-Meeting with a webinar solution that is easy to use and with improved screen sharing. ClickMeeting is a browser-based web conferencing program with a user-friendly interface that covers the whole webinar process, from planning to follow-up, according to Daniel (2021).

4.5.4.18. Google-Hangouts

The free online platform Google-Hangout integrates with YouTube. Chrome and a YouTube subscription are required for online conferencing. This implies that participating teams can join from anywhere as long as they have a Google account and the Chrome browser.

4.5.4.19 Demio

This clever webinar platform is easy to put up and has strong tracking features (tracking, retargeting, and recording). Demo is a cutting-edge social media tool used for engagement and capacity building, according to Saeed (2021).

4.5.4.20. Lifesize

This is a good quality video conferencing solution been used for many years, tested and trusted by many professionals. The Lifesize App is easy to use and specializes in both cloud-based video conferencing.

4.5.4.21. Webex

Webex is an online conferencing tool that facilitates group communication. Through voice or HD video chats, users may collaborate and screen-share from various perspectives. Reference librarians in libraries may utilize this to provide live reference services and address users' inquiries from various perspectives.

4.5.4.22. Webinarian

A comprehensive live stream of events may be produced using the straightforward video conferencing program Webinarian. Daniel (2021) claims that webinarian is compatible with the majority of devices and operating systems, supports different languages, and has thousands of registrants throughout the world.

4.5.4.23. Simple Webinar

This is another another intriguing website with a mobile app, pre-built sales funnel, HD video, and chat capabilities that make it easy to use and can be utilized to give library services live online.

4.5.4.24. Conclusion

The emergence of ICT with particular achievement of knowledge digitisation has brought a paradigm shift in knowledge delivery. This paper going by its purpose has found new innovative delivery strategies to digital knowledge in tune with 21st century requirements. These innovations have become useful tools in digital knowledge delivery particularly in academic libraries whose mission is to support teaching, learning and research. Thus, there acquaintance by knowledge managers and application in digital knowledge delivery would surely Improve professional competence of knowledge managers (librarians) particularly working in academic libraries. Professional librarians working in academic libraries in the twenty-first century are expected to take use of ICT's potential to reposition academic libraries as the center of information production, provision, and dissemination. In light of this, the following suggestions were made:

1. Quickly supplying the libraries with enough money, especially academic libraries, to enable them to finance the use of new inventions included therein
2. It should be a top priority to teach and retrain librarians for the twenty-first century. This is due to the fact that a library's personnel is what determines whether it succeeds or fails.
3. To remain competent and defend their profession in the 21st century and beyond in the face of diminishing budgetary cuts, librarians in the 21st century should take personal steps to advance their abilities.

4.6 Enhancing Library and Information Management Through the Use Of Social Media

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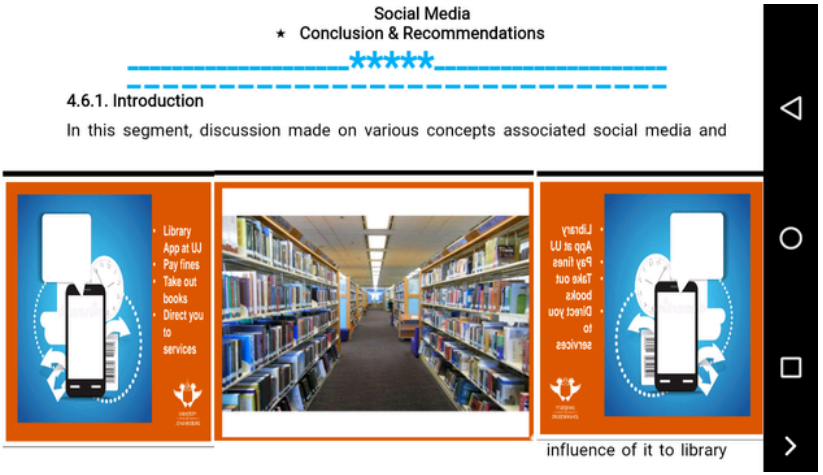

HighLights:

« **Introduction**

« **The Concept of Web 2.0 / Library 2.0 and Social Media**

« **Enhancing Information Acquisition, Organization and Dissemination through Social Media**

« **Conclusion & Recommendations**

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4.6.1 Introduction

In this segment, discussion made on various concepts associated social media and influence of it to library and information management. Various social media tools that can be effectively used to share information with the library patrons and to improve library and information management in present era also outlined. And finally, Suggestion made for library and information professionals to rethink for implementing web 2.0 technologies in library services from the inception so as to measure up with the present demand of the users.

The invention of the computer has significantly increased the range of intellectual pursuits available to humans. Every field has undergone revolutionary transformation as a result of its application and integration with telecommunication, and library and information management practice is no different. Information management, which includes documentation, records management, and technical infrastructure, is the skillful exercise of control over the acquisition, organization, storage, security, retrieval, and dissemination of the information resources necessary to the successful operation of a business, agency, organization, or institution (Reitz, 2004). Information management

activities are characterized as "planning, organizing, and overseeing the people and material resources in an information system" by Aina (2004).

The information environment's information and communication technology (ICT) revolution has significantly altered how libraries look and what services they offer to patrons (Lynch, 2000). The development of the electronic library system was characterized by the use of ICTs in library and information management, and today social media, mobile technologies, and Library 2.0 are leading the way in this area. According to Alonge (2014), libraries have been integrated at the electronic frontier due to the rapid advancements in ICT, enabling the quick flow of information on a worldwide scale. Super search engines, social media platforms, web 2.0/library 2.0, improvements in computer storage and communications techniques, online access to databases, electronic journals, and electronic knowledge banks are all examples of modern Internet and World Wide Web (www) usage. The innovative advancements in the previous two or three decades—direct document delivery, teleconferences, CD-ROMs, networks, etc.—have significantly altered how information is handled and stored..

4.6.2 The Concept of Web 2.0 / Library 2.0 and Social Media

Without a doubt, the rapid development of ICT has resulted in the integration of social media into information management and library services. Social media, which is seen as a subset of Web 2.0 applications, is defined by Junco et al. (2011) as "a collection of internet websites, services, and behaviors that encourage collaboration, community building, participation, and sharing." "A range of Internet-based apps that build on the theoretical and technological underpinnings of Web 2.0, and that enable the creation and exchange of user-generated content," according to Mcgrath (2012), is what is meant by social media. Instead of the conventional one-way style of web authorship, Web 2.0 is a set of server-based technologies that have made the web a publishing platform (Abram, 2005). All Internet users are encouraged to exchange, work together, and participate in the creation of websites using these solutions. The emerging generation of online tools and apps is simply referred to as "Web 2.0." The Web 2.0 phenomenon has had a big influence on the information environment since it first emerged in 2004. It runs the Library 2.0 platform. The notion of Library 2.0, as defined by Michael (2005), is one in which users are both content producers and consumers of knowledge. It is a library with no set bounds and the most active involvement of users acting as architects. In actuality, the phrase "Library2.0" refers to the incorporation of multi-media, interactive, and collaborative web-based technologies into online library services and collections. The goal of Library 2.0, according to Alonge (2014), is to bring the library to the users' locations so that it can better serve them and foster professional collaboration among librarians. The four core components of Library 2.0 that are seen to be the most appropriate for modern library and information management are:

§ User-centered: In the sense that users contribute to the production of the services and material they access on the library's website, OPAC, etc., it is user-centered.

§ Video and audio are included in all collections and services to give a multi-media experience.

§ Socially rich: It is socially rich in the sense that the library's online presence considers users' presences by offering synchronous (like IM) and asynchronous (like wikis) ways for users to interact with other users and with librarians/managers.

§ Innovative from a community perspective: By giving patrons the chance to influence how the library is changed, it is innovative from a community perspective.

The creation of highly interactive platforms for people and communities to co-create, discuss, and alter user-generated content as well as share and exchange information and ideas in virtual communities and networks is another way that social media is dependent on mobile and web-based technology. Social media technologies include video-sharing websites like YouTube as well as networking platforms like Facebook. Although the functionality, user interface, and applications of each tool might vary greatly, they all facilitate cooperation and sharing so that "everyone and anybody can share anything anywhere anytime" (Joosten, 2012). Among the social media resources are:

§ MySpace: People may meet friends, chat online, and exchange resources on MySpace (http://www.myspace.com) and Facebook, two of the most well-known social networking sites.

§ Facebook is a popular social media platform among students and is user-friendly for librarians. Web 2.0 allows for the possibility of customer group communication.

§ Ning: A librarian may connect with students, library associations, and others with this application. It may also be used to provide information to several individuals simultaneously.

§ Blog: By starting a blog, you may instantly share content with a large audience. Blogs are a great tool, especially when paired with RSS, for communicating with library personnel or informing students about new resources.

§ No matter which IM client they use, students may connect and help one another on Meebo. Professionals can influence clients by using virtual reference services in libraries or online chat.

§ LinkedIn is a fantastic resource for connecting library visitors with those who can direct them to the information they need. They may locate them in your LinkedIn network, whether you are one of them or academics, writers, historians, or other sources.

§ Use Twitter to notify employees and customers on daily operations, such as constantly updated collections, new arrivals, and current content offerings of libraries.

4.6.3 Enhancing Information Acquisition, Organization and Dissemination through Social Media

Due to its widespread usage, social media is today's libraries' and information managers' most effective ally for disseminating information to clients in the quickest and most comprehensive manner possible. It was previously stated that there are 750 million active Facebook members worldwide. There are 250 million users of Twitter, 115 million users of LinkedIn, 50 million users of MySpace, and 25 million users of Google Plus globally (Googlefan, 2011). Due to the daily increase in social network users, these figures may have treble in the current scenario. Three main tasks in library and information management that librarians might do via social media are:

§ Information sourcing/acquisition,

§ Information organization/cataloguing, and

§ Information communication/dissemination.

4.6.3.1. Information sourcing/acquisition:

The social media is used to source for information in many cases. Through it librarians/managers get in contact with individual and corporate donors. The social media tools listed above are access points to information in digital environment coupled with the websites of corporate donors, example of which are:

African Library Project http://www.africanlibraryproject.org

American Mathematical Society http://www.ams.org/home/page

Better World Books http://www.betterworldbooks.com

Book Aid International http://www.bookaid.org/cms.cgi/site

The Bookman http://www.thebookman.org

Books Abroad http://www.booksabroad.org.uk

Books for Africa http://www.booksforafrica.org

Books for All http://www.archive.ifla.org/vii/s10/1996/b4all.htm

Books for International Goodwill http://www.big-books.org/

Books for Kids http://www.booksforkids.org/

Books for Soldiers http://www.booksforsoldiers.com/

Darien Book Aid Plan http://www.dba.darien.org/

Book Project of the World Bank Volunteer Services http://www.worldbank.org/yournet

4.6.3.2. Information organization/cataloguing:

Social software can help librarians/managers in information organization. Alonge (2014) outlined the following tools that can be effectively used in library and information centre for patrons:

§ Del.icio.us: the social bookmarking tool that permits one to create a custom directory for library patrons.

§ With the aid of Netvibes, you can make a public page that anybody can see and use to direct visitors to useful websites, news feeds, and other content. Many of the resources described here, including Flickr and library blogs, can be connected with it.

§ LibraryThing is a social cataloging platform that is excellent for librarians and can be used to categorize materials from more than 200 other libraries worldwide as well as Amazon and the Library of Congress.

4.6.3.3. Information communication/dissemination:

Social media is a platform where individuals may work together to produce and share content. It brings about significant and extensive changes to how businesses, communities, and people communicate. In an online collaborative setting, social media facilitates successful communication and engagement between nformation managers and information users. It is the easiest and quickest approach to spread information to users in a wide-ranging manner. The following social media platforms may be utilized to efficiently convey information with users:

Picasa: To distribute brand-new picture collections, use this image distribution tool. Libraries can use this to share their photo collections of seminars, conferences, and other campus events. This is a tool that librarians and information managers may use to construct sets with metadata, as well as take advantage of the many plugins available for Picasa users.

YouTube: tutorials, events, and other video for e-learning and libraries YouTube may be used to efficiently advertise and broadcast library services online.

Wikipedia: Wikipedia is a user-edited online encyclopedia. By modifying or guiding library users, librarians and information managers can utilize this technology to disseminate information and knowledge. Wiki software like PBWiki may also be used to host library websites.

SlideShare: this is a fantastic platform for sharing knowledge throughout the academic community. It promotes academics, staff, and students sharing their slide shows so that the larger community may view them.

StumbleUpon: This is a different website where resources for research, articles, and more of these are display and access in the network.

4.6.4 Conclusion

The multidisciplinary nature of Library and Information management means that whatever developments that occur in ICT should of necessity be of interest to the Librarians/information managers otherwise effective and efficient service delivery may be impaired. For the practice of librarianship to remain relevant in the face of ICT revolution, library and information professionals need to change the way we communicate and connect with library clienteles by embracing social media. Today, library and information professionals should rethink for the possibility of web 2.0

technologies in library services so as to measure up with the present demand of the users.

4.7 4IR And Innovative Library and Information Service Delivery in The Digital Age

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HighLights:

« Abstract
« Introduction
« 4IR Concepts
« 4IR Technologies & the Libraries
« 4IR Potentialities and the Libraries
« Challenges of the 4IR & the Libraries
« Prospects of the 4IR and the Libraries
« Conclusion & Recommendations

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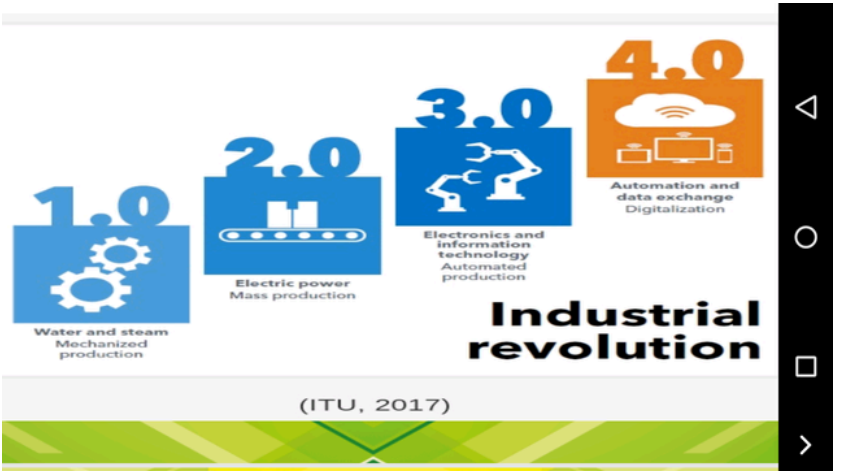
*This is a paper previously presented in a conference but found important in this chapter.

4.7.1 Abstract

Fourth Industrial Revolution (4IR) was declared by the World Economic Forum' 2017 as the catalyst changing the world, because it is characterises with new technologies that combine the physical, digital and biological worlds that are impacting all disciplines, economies and industries. As the world now moves into the Fourth Industrial Revolution, there is a sense of urgency for libraries to use 4IR technologies for sustainable development, to provide services to improve all library users' quality of life directly or indirectly. Libraries have the opportunity to move directly into the 4IR without going through the previous industrial revolutions. This requires that libraries give a sense of urgency and high priority to the transition into the 4IR. This is already happening in some libraries that are establishing plans and activities for the Fourth Industrial Revolution. Thus, this paper explores how the 4IR is changing productivity and service delivery in emerging libraries, shining a light on existing and future opportunities for these libraries to harness innovation for sustainable outcomes. Also discussed are concept of 4IR, 4IR technologies, 4IR advantages, 4IR technologies in libraries, challenges and prospect of 4IR in libraries. Recommendations were for the needful to harness innovations in 4IR such as provision of adequate fund, facilities, trainings and enlightenment; need to empower library staff particularly librarians, and also educate users to use emerging 4IR technologies for sustainability in digital age.

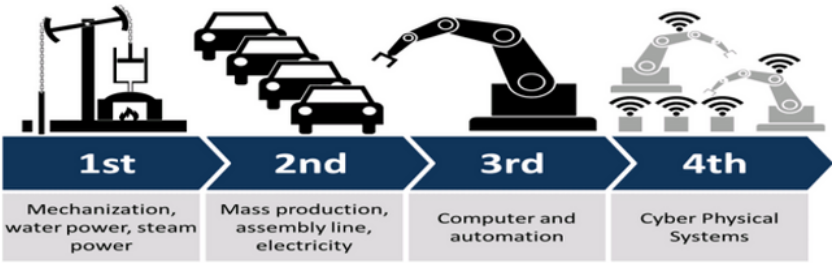
Key terms: 4IR, Service delivery, digital age.

4.7.2 Introduction



Fourth Industrial Revolution (4IR) is a talk of the day and mainstay in human endeavors. It commences towards the end of the first decade of the 21st century. Before now, many revolutions have occurred all in the quest for making easy life at work and increasing proficiency and productivity. The first profound industrial revolution in our way of living spanned from about 1760 to around 1840, triggered by the construction of railroads and the invention of the steam engine. This ushered in mechanical production. The second industrial revolution, which started in the late 19th century and into the early 20th century, made mass production possible, fostered by the advent of electricity and the assembly line. The third industrial revolution began in the 1960s. It is usually called the computer or digital revolution because it was catalysed by the development of semiconductors, mainframe computing (1960s), personal computing (1970s and 80s) and the internet (1990s). The fourth industrial revolution began at the turn of this century and builds on the digital revolution. It is characterized by a much more ubiquitous and mobile internet, by smaller and more powerful sensors that have become cheaper, and by artificial intelligence and machine learning (Schwab, 2016). As the world now moves into the Fourth Industrial Revolution, there is a sense of urgency for libraries to use 4IR technologies for sustainable development, to provide services to improve all library users' quality of life directly or indirectly. However, libraries must make sure that they have the infrastructure to take advantage of 4IR technologies. The World Economic Forum (2017) declared that the 4IR is changing the world, because new technologies that combine the physical, digital and biological worlds are impacting all disciplines, economies and industries. Libraries have the opportunity to move directly into the 4IR without going through the previous industrial revolutions. This requires that libraries give a sense of urgency and high priority to the transition into the 4IR. This is already happening in some libraries that are establishing plans and activities for the Fourth Industrial Revolution. However, libraries in developing countries need to empower library staff particularly librarians, and also educate users to the use of emerging 4IR technologies for sustainable development.

4.7.4 Concept of 4IR



The Fourth Industrial Revolution, also known as 4IR or Industry 4.0, refers to the fusion of the physical, digital and biological worlds (Ndung'u and Signe, 2020). The 4IR was coined by coined by Prof. Klaus Schwab, the founder and executive chairman of the World Economic Forum (WEF). He described it as 'a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres' (Schwab, 2016). 4IR is mainly characterized by the fusion of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies, among others, which has ushered in a new era of economic disruption with uncertain socio-economic consequences particularly for developing natioan (Ndung'u, and Signé, 2020). Sharing the same view, Deloitte (2020) 4IR as 'the marriage of physical assets and advanced digital technologies - the internet of things (IoT), artificial intelligence (AI), robot, drones, autonomous vehicles, 3D printing, cloud computing, nanotechnology, and more - that communicate, analyse, and act upon information, enabling organisations, consumers, and society to be more flexible and responsive and make more intelligent, data-driven decisions'. Entering the 4IR era, there are megatrend drivers within physical, digital and biological environment that disrupt the common ways of human lifestyle, industrial production and government policies. The Fourth Industrial Revolution (4IR) era according to Zamonbo (2022) is characterized by digital revolution, knowledge-economy, heightened globalization, internationalization of higher education, information explosion, and emerging labor markets. This era has revolutionized all professions, institutions, operations, and cultures. Digital technologies are now regarded as critical catalyst for improving, supporting, extending teaching and creative learning in higher education across the globe. Fourth Industrial Revolution will be driven largely by the convergence of digital, biological, and physical innovations while the 4IR libraries regarded as hybrid libraries that bring together the best of the physical and the digital to create learning hubs.

4.7.5 4IR Technologies and libraries

4IR technologies are varieties of advanced technological applications that aid huhuman endeavors. Some of the most widely used 4IR technologies include Artificial-Intelligence (AI), robotics, drones & autonomous vehicles, big data, internet of Thing (IoT), cloud computing, quantum computing, biotechnology, blockchain (distributed ledger), 3D printing, Extended Reality (XR), and smart sensors. These categories, in turn, contain numerous sub-categories. For instance, AI encompasses single-task bots, digital assistants, machine learning and deep learning. XR includes Augmented Reality (AR), Mixed Reality (MR), Remote Augmented Reality (RAR) and Virtual Reality (VR).

As mentioned, AI, XR and ICT are being applied to holistic, immersive learning environments as well as in providing immersive MR learning experiences (Mavrikios et al, 2019). Learners in a holistic, immersive learning environment used holograms, mobile technologies and finger-tracking to interact with educational resources and employees, and can create what are often intense, highly interactive, immersive real and virtual world experiences, which can stimulate most end users' sensory perceptions, including learners. Such technologies are used in education to offer real-life situational experiences, which can be used in library settings to enhance users experience in the library. 4IR technologies such as artificial intelligence (AI), autonomous vehicles and drones, the Internet of things, 3D printing and biotechnology are particularly relevant to library usage. Many are already showing promise at reshaping libraries; changes and accelerating provision of services. Libraries can harness these pioneering technologies, combined with each other and with new business models, to not only enhance productivity but to reduce effort, time and cost spent on repetitive tasks and increase wellbeing. Artificial intelligence (AI) and blockchain are also attracting interest in information preservation and manipulation as they have the potential to successfully address challenges face in usual way of doing this. These technologies are so many and could be transformational in many areas of the library.

All new technologies have one key feature in common; they leverage the pervasive power of digitization and information technology. All of the technologies described in this segment are made possible and are enhanced through digital power. To identify the megatrends and convey the broad landscape of technological drivers of the fourth industrial revolution, the discussion is further made into three clusters: physical, digital and biological. All three are deeply interrelated and the various technologies benefit from each other based on the discoveries and progress each makes.

Physical: There are four main physical manifestations of the technological megatrends, which are the easiest to see because of their tangible nature; autonomous vehicles, 3D printing, advanced robotics, and new materials.

Autonomous vehicles: The driverless car dominates the news but there are now many other autonomous vehicles including trucks, drones, aircrafts and boats. As technologies such as sensors and artificial intelligence progress, the capabilities of all these autonomous machines improve at a rapid pace. It is only a question of a few years before low-cost, commercially available drones, together with submersibles, are used in

different applications (Zambo, 2019). As drones become capable of sensing and responding to their environment (altering their flight path to avoid collisions), they will be able to do tasks such as delivering library material to remote area through mobile services.

3D printing: Also called additive manufacturing, 3D printing consists of creating a physical object by printing layer upon layer from a digital 3D drawing or model. This is the opposite of subtractive manufacturing, which is how things have been made until now, with layers being removed from a piece of material until the desired shape is obtained. By contrast, 3D printing starts with loose material and then builds an object into a three-dimensional shape using a digital template. The technology is being used in a broad range of applications. For the moment, it is primarily limited to applications in the automotive, aerospace and medical industries. Researchers are already working on 4D, a process that would create a new generation of self-altering products capable of responding to environmental changes such as heat and humidity. This technology could be used in humidity control in most outfits as well as in the libraries.

Advanced robotics: Until recently, the use of robots was confined to tightly controlled tasks in specific industries such as automotive. Today, however, robots are increasingly used in many sectors including library and for a wide range of tasks. Rapid progress in robotics will soon make collaboration between humans and machines an everyday reality. Moreover, Advances in sensors are enabling robots to understand and respond better to their environment and to engage in a broader variety of tasks. The presence of advanced robotic is noted in University of Pretoria with the employment of Libby - the new robotic library assistant, and this shall spring to many libraries soon.

Internet of Things (IoT): One of the main bridges between the physical and digital applications enabled by the fourth industrial revolution is the internet of things (IoT) sometimes called the "internet of all things". In its simplest form, it can be described as a relationship between things (products, services, places, etc.) and people that is made possible by connected technologies and various platforms. Sensors and numerous other means of connecting things in the physical world to virtual networks are proliferating at an astounding pace. The digital revolution is creating radically new approaches that revolutionize the way in which individuals and institutions engage and collaborate. For example, the blockchain, often described as a "distributed ledger", is a secure protocol where a network of computers collectively verifies a transaction before it can be recorded and approved. The technology that underpins the blockchain creates trust by enabling people who do not know each other (and thus have no underlying basis for trust) to collaborate without having to go through a neutral central authority, i.e. a custodian or central ledger. In essence, the blockchain is a shared, programmable, cryptographically secure and therefore trusted ledger which no single user controls and which can be inspected by everyone. (Schwab, 2016). These technologies shall soon influence and enhance information preservation in libraries as they are gradually manifesting in other outfits of information presentation.

4.7.6 4IR Potentialities and the libraries

The transformative potential of 4IR is substantial encouraging economic growth and structural transformation in recent years. The 4IR introduced the virtual world (Pantami, 2022). The virtual world is increasing efficiency, certainty, and security in an environment where information flow is critical for economic growth and job creation. Failure to recognize and capitalize on 4IR opportunities, conversely, will impose considerable risks on outfits left behind. Without attempts to tap opportunities brought by 4IR, libraries in Nigeria risk falling further behind, exacerbating the global digital divide and lowering their global competitiveness.

The use of 4IR technologies by libraries can empower library users with access to information and services that improve their standard of learning and living. Artificial Intelligence (AI), the Internet of Things (IoT), and blockchain can enhance opportunities for information gathering preservation, and delivering for more targeted users, highly effective and cost reduction. Already, we have witnessed the transformational power of formal information services through mobile phones, reaching nooks and cranies. 4IR technologies allow presentation of information in secure medium and enlarge stock base of libraries and escape problems of shortage of spaces. The 4IR represents a massive opportunity for growth. Indeed, the 4IR is dramatically changing global systems of labor and production, requiring that job seekers cultivate the skills and capabilities necessary for adapting rapidly to the needs of firms and automation more broadly (Ramofosa, 2019).

4.7.7 Challenges of the 4IR

The fourth industrial revolution will generate great benefits and big challenges in equal measure. A particular concern is exacerbated inequality in ability to use 4IR latest technologies and even expected technologies. Two factors brought about this; inequality in access to IT facilities and inequality in IT skills from the part of producers and consumers (library staff and users). The challenges posed by rising inequality are hard to quantify as a great majority of us are consumers and producers, so innovation and disruption will both positively and negatively affect our living standards and welfare. (Schwab, 2016). Of the many diverse and fascinating challenges, we face today, the most intense and important is how to understand and shape the new technology revolution, which entails nothing less than a transformation of humankind. We are at the beginning of a revolution that is fundamentally changing the way we live, work, and relate to one another. In its scale, scope and complexity, 4IR is unlike anything humankind has experienced before, a such, we are yet to grasp fully the speed and breadth of this new revolution. Consider the unlimited possibilities of having billions of people connected by mobile devices, giving rise to unprecedented processing power, storage capabilities

and knowledge access. Or think about the staggering confluence of emerging technology breakthroughs, covering wide-ranging fields such as artificial intelligence (AI), robotics, the internet of things (IoT), autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing, to name a few. Many of these innovations are in their infancy, but they are already reaching an inflection point in their development as they build on and amplify each other in a fusion of technologies across the physical, digital and biological worlds. We are witnessing profound shifts across all industries, marked by the emergence of new business models, the disruption of incumbents and the reshaping of production, consumption, transportation and delivery systems. These changes are cumbersome in terms of their size, speed and scope. While the profound uncertainty surrounding the development and adoption of emerging technologies means that we do not yet know how the transformations driven by this industrial revolution will unfold, their complexity and interconnectedness across sectors imply that all stakeholders of global society; governments, business, academia, and civil society, etc, have a responsibility to work together to better understand the emerging trends.

On Nigeria industries, particularly library industry, what appear to underpin fast grasp of 4IR opportunities are;

§ Administrative barriers: unnecessary protocols in planning and implementation of use of technologies,

§ Psychological barriers: consumers/users resistance to new technologies,

§ In-appropriate policies guiding use of technologies

§ Lack of long-term planning to the use of technologies

§ Inadequate financial support to the use of technologies

§ Absence of local resources suitable to our needs

§ Lack of shared initiatives of workers/staff

§ Lack of appropriate and consistent ICT Training Programs

§ Inadequate skilled manpower, and

§ Inadequate infrastructure

The challenges threatening 4IR transformation in Nigeria industries and Nigeria libraries in particular are enormous. Inadequate financial support, inappropriate policies, lack of long-term planning, and absence of local resources among others prevail in the libraries, and this was found in the reports of some researches such as Tanimu (2017) and Enagi, et'al (2022).

4.7.8 Prospects of the 4IR and the libraries

Countless organizations have produced lists ranking the various technologies that will drive the fourth industrial revolution. The scientific breakthroughs and the new technologies they generate seem limitless, unfolding on so many different fronts and in so many different places. (Schwab, 2016). In a lecture titled 'A national strategy for

harnessing the Fourth Industrial Revolution: The case of South Africa' Cyril Ramaphosa, President of the Republic of South Africa said:

"The Fourth Industrial Revolution (4IR) represents the great tectonic shift of our time. It is creating new possibilities for improving people's lives. Disruptive technologies like machine learning, artificial intelligence, and big data are changing the way we live, the way we work and do business, and the way we govern. As a continent that continues to be impacted by historically low levels of development, Africa can and must take advantage of technological advances to industrialize, pursue inclusive growth, and attract investment. It must also be at the forefront of driving new solutions to our developmental challenges, like access to health care and education. South Africa is preparing itself to take the great quantum leap into the future, and in doing so to ensure that technological advances benefit all, and not a select few."

In addition to this, that 'by 2030, we aim to be a nation that has fully harnessed the potential of technological innovation to grow our economy and to uplift our people. To this end, we have established a Presidential Commission on the Fourth Industrial Revolution to develop an integrated national response strategy'. Developing integrated strategy is what would guarantee 4IR transformation in outfits and countries not only South-Africa. For the nations and outfits, including libraries to survive in this era of 4IR, commission or committee must be composed with the representatives of cyber-specialists, technologists, academia, researchers, social scientists, trade unionists, and other stakeholders; representatives from key economic sectors so as to look into issues of 4IR. This commission or committee should have various workstreams on issues such as infrastructure/resources, technology and innovation, human capital, industrialization, and policy and legislation. Moreover, steering ahead the usage of 4IR is threefold;

First, outfits including libraries need to respond with agility and purpose; they must be adaptive and responsive to the pace of change. They must be determined to take advantage of the opportunities technological change presents to enhance global competitiveness.

Second, prosperity of 4IR in nations and outfits will be visible when also we develop capabilities to further our scientific and technological understanding. Scientific and industrial research into complex contemporary challenges is recognised as the drives to the sustainability of 4IR now and ahead.

Third, outfits and libraries must aim to ensure that consumers or users are prepared to shield them from adverse consequences of technological change, and to prepare them for the developments of the future.

Nigeria libraries in particular, should be fully integrated into the libraries of the future, libraries that use 4IR technological innovation to revolutionize library processes and service provision and delivery. Libraries in nearest future would demonstrate how science, technology, and innovation have been used to enhance human workforce; libraries where users feel the impact of 4IR realities, which means library workforce should be skilled and empowered to enjoy the transformative benefits of a new world of

work. Library is a centre of learning/research, advance technologies should be use to catalyze research activity. Library growth will be driven by adaptability to the use of advance technologies in the future. Library 2.0 will enable us to 'leapfrog' outdated processes and technologies in favor of newer, more sustainable ones. Library growth lies in scaled-up investment in disruptive technologies, especially with the rapid growth of the users of libraries, more people registering their presence in library fatforms to improve their levels of education and awareness. However, libraries ability to harness the 4IR rests on forging collaborative partnerships between government and the private sector, with policymakers and industry experts. Together with other stakeholders, the unique partnership will explore how 4IR innovations could help drive libraries transformation. Also, balancing the impact of complex interactions between libraries and the library users will be vital for a sustainable future. In emerging libraries, action to address the following key challenges will be particularly important for delivering library sustainability and could be supported by 4IR innovations:

1. Smart planning and implementation to make better use of the digital technologies;
2. Sustainable Networking to increase mobility of library services and connectivity to the library;
3. The 4IR technologies provision and utilities to improve efficiency of library systems and the services;
4. Provision of adequate facilities and resources to lower cost and improve affordability;
5. Resilient integrated library systems to enable libraries to prepare for, and withstand, 4IR shocks and disasters.

4.7.9 Conclusion

Much of the discussions in this paper are based on ongoing revolution and initiatives across the world. Concept, potentialities, and prospects of 4IR have been discussed and analysis of challenges. Thus, this paper provides a framework for shaping the future activities of libraries in 4IR era. It is in that sense conclusion made by suggesting practical ideas and solutions on how best libraries are to adapt, shape and tap the potential of this great transformation. First, shared understanding is particularly critical if libraries are to shape a collective future that reflects common objectives and values. Libraries must have a comprehensive and globally shared view of how 4IR is changing present lives and those of future generations, and how it is reshaping the economic, social, cultural and human context in which we live. Above all, libraries must take dramatic measures to invest on 4IR actualisation, and drawn attention and energy in multistakeholder cooperation across academic, social, political, national and industry boundaries. These interactions and collaborations accordig to Schwab (2016) are needed to create positive, common and hope-filled narratives, enabling individuals and groups

from all parts of the world to participate in, and benefit from, the ongoing transformations. We are convinced with ongoing urge and realities in our libraries that potentialities of fourth industrial revolution will be powerfully tapped, impactful and historically important more than previous three revolutions.

4.8 QR Code & Applicability to Library & Information Services

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HighLights:

« **The Concept of QR codes.**
« **The Features of QR Codes**
« **The merits of QR Codes**
« **Functions of QR Codes**
« **How to Operate QR Codes**
« **How to generate a code**
« **How to acquire QR Code Readers**
« **Application of QR code in libraries: virtues & value**
« **The technology of QR Code in Libraries**
« **The need for Quick Response (QR) codes application in Nigeria libraries**

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4.8.1 The Concept of QR Codes

Quick Response (QR) code is a type of two-dimensional bar code appears as a small white square with black geometric shapes in which data are encoded based on the position and combination of the black spots read by smart phones\androids with camera. Quick Response (QR) is often referred to as mobile code. It can be termed as a matrix barcode as it is readable by smart phones with the help of mobile cameras. QR codes can hold much more information than a regular barcode. The information encoded in a QR codes can be a URL, a phone number, an SMS message, a V-card, or any text. It is referred to as QR because it quickly respond to the query, i.e. allow the contents encoded in to be decoded at high speed. The idea behind the development of the QR code is the limitation of the barcode information capacity (can only hold 20 alphanumeric characters)

It links the physical world (poster, printout, physical object, etc) to the electronic and facilitates communication, adding significant value by improving accessibility to information. In fact, QR code printed on physical materials like posters, handouts or

objects will divert to the content in electronic form or allows user to communicate electronically. Historically, QR code was developed as an improvement to the existing barcodes for application in inventory management by Toyota subsidiary Denso Wave in 1994. Therefore, it was initially used for tracking inventory in vehicle parts manufacturing but since then, the QR code has gained wide acceptance in diverse industries such as manufacturing, ware housing, logistics, retailing, health care, life senses, transportation and office automation etc. Now with the explosive growth of smart phones, the QR code is also being used in mobile marketing as a fast and effective way of connecting with customers and providing end user content. Libraries in the present days, are also adopting the technology of QR rapidly. In the developed countries, the likes of America, Britain, Japan and also India, the use of QR codes to cater most crucial user demand for access to information through mobile phones is widely practiced. QR code is capable of handling more information compared to conventional barcodes; capable of storing approximately 20 digits. Small printout size QR code carries information both horizontally and vertically. Hence QR code can hold the same amount of data contained in a barcode in only one-tenth the space of it. Damage resistant QR code has error correction capability. Data can be restored even if the symbol is partially damaged. A maximum 30% of code word can be restored.

The QR code consists of black modules arranged in a square pattern on a white background. The code was designed to allow its contents to be decoded at high speed. QR code has high speed reading. It accomplishes this task through position detection patterns located at the 3 corners of the symbol. This position detection pattern guarantees stable high-speed reading.

4.8.2 The Features of QR Codes

Quick Response (QR) code system consists of a QR code encoder and decoder. The encoder is responsible for encoding data and generation of the QR Code, while the decoder decodes the data from the QR code. The module configuration of the basic QR codes is explicit. The symbol versions of the QR Code range from Version 1 to Version 40. Each version has a different module configuration or number of modules. (The module refers to the black and white dots that make up QR Code.) "Module configuration" refers to the number of modules contained in a symbol, commencing with Version 1 (21 × 21 modules) up to Version 40 (177 × 177 modules).

Other features of QR codes entail their capabilities ahead of conventional barcode which according to Denso Wave 2 (the developers of QR Codes) include:

1. High storage capacity; conventional barcode can store a maximum of 20 digits whereas QR Code capable of storing hundred to thousand-fold of more information. A QR code Data storage capacity: Max. 7,089 numeric characters, Max. 4,296 alphanumeric characters, Max. 2,953 binary bytes, Max. 1,817 Kanji, full-width Kana characters or a mixture of all others (Adebayo, 20??).

2. Capability of handling variety of data; QR codes are capable of handling all data varieties, such as Alpha-Numeric, Special characters, Kanji, Kana, Hiragana, binary and control codes.

3. Little output size needed; As for QR Codes, very little output Size is needed, because QR code carries data both horizontally and vertically, and when this compare with barcode, QR code is capable to store same quantity of data in about one-tenth of the area.

4. Possess error correction capacity; QR Code has error correction capacity which even dirty or broken image is repaired and max. up to 30% code will be corrected.

5. Omni-directional in nature; QR Code is readable from any direction across 360 degrees, i.e. omni-directional.

6. Structured Append Feature; QR Code has Structured Append Feature, in which QR Code is divided into multiple data areas and all the information is stored in multiple QR Code symbols that can be recreated as single data symbols.

4.8.3 The MERits of QR Codes

The popularity of QR codes is growing rapidly across the world. Nowadays, mobile phones with built-in camera are widely used to recognize the QR Codes. This attraction is as a result of tremendous impacts derive from it and the efficiency of usage. Some of these are:

1. It is fast; quick response, as it works in a nano second.

2. It stores huge amount of data because it has high storage of encoding information. It contains more storage capacity in comparison to barcode and used by any direction angle as against barcode usage.

3. It is use anywhere

4. Its application required no specific skill (no special skill or expertise).

5. It is flexible; no complication, no additional technology required, No technical accessories, only require smart phones like Android phones, iphone with proper internet connection.

6. Details used anytime, anywhere by anyone, and

7. Increased customers satisfaction

8. It is freely available.

9. Safety granted because it has damage resistance and can recover data in the event of lost or damage; it can easily restore data and detect error correctly.

10. QR code enhances mobile learning; it is a technology-based library services that facilitates mobile learning. The QR Codes can be fixed or pasted on any flat surface in the Library like Printed handouts, shelf ends, WebOPAC Desk, Reference Desk, Magazine racks, etc, and information accessed easily.

4.8.4 Functions of the QR Codes

QR codes are superb in performing many functions. Some of these functions culled from Adebayo (2013) are:

1. Encode phone numbers, text messages, commands and phone data.
2. Prompt to direct to open a URL
3. Bookmark a site link • Prompt to form a call from mobile
4. Prompt to send a SMS from mobile
5. Prompt to begin an email
6. Send a vCard
7. Store a date in your calendar (to schedule an appointment)
8. Return text
9. Encryption
10. Record geographic coordinates some of the QR Codes designed to offer multiple functions from advanced smart phones.

4.8.5 How TO Operate QR CODES

To operate QR code is simple; it is short and straight forward. Information may be encoded into a QR code by QR Code generator. Some of QR Code generators available online and are listed ahead. Data may be easily encoded in to QR codes by using any freely available QR code generators. To do this, enter the information to be encoded in to the sphere provided by generators. QR code generators may ask you to enter data to data fields available, encode the data. Once the data have been crammed by information fields in correct format, QR code generator generates QR code for the data in image format (JPEG, BMP, and PNG etc.). This could be used directly on internet or mails in e-format or revealed in Print format. By using QR code generating sites or apps, users can generate and print their own QR codes for others to scan and use.

However, decoding of QR codes may be done by online QR code decoders associated with any internet enabled good phone that has QR code Reader software package program pre-installed or downloaded from varied sites freely available on internet. QR codes may be decoded with online decoder the likes of; MiniQR, on-line Barcode Reader, ZXing Decoder on-line, Saint Patrick Wied QR Generator, QR Code Generator and Recovery. QR codes can also be decoded with good phone's camera by scanning with image capture and then pre-installed QR code reader decodes the QR code and displays content as text or uniform resource locator format. Moreover, QR codes trigger mobile device navigate to an internet page actions like dial variety, send SMS, Save Reminders, and save variety to phone book, and many more. Some common functions of QR Code were previously itemised in the heading above this.

4.8.6 How to Generate a Code

Several QR code generators abound. Some of these are listed below:

MyQR (http://myqr.co/)
GoQR.me (http://goqr.me)
QR Stuff (http://www.qrstuff.com)
Kaywa (http://qrcode.kaywa.com/)
QRMobilize (http://qrmobilize.com)
BeQRious (http://www.beqrious.com/qrcode/create)
Bosqweb (http://www.bosqweb.net/en/QR-code-generator)
QReate & Track (http://app.qreateandtrack.com/#/create/event)
Quickmark (http://www.quickmark.com.tw/En/qrcode-datamatrix-generator/)
QR Code and 2D Code Generator by Kerem Erkan (http://keremerkan.net/qr-code-and-2d-code-generator/).

4.8.7 How to Acquire QR Code Readers

Acquisition of quick response codes is made simple. Most of the modern day Smart mobile phones available in market come with pre-installed QR Code readers. Nevertheless, one can download the QR Reader software from various online service providers freely. Although some may require registration before permission to download but here is the list of some QR Code reader software available on web for free to download:

BeeTagg (http://get.beetagg.com/)
UpCode (http://www.upcode.mobi/)
MobileTag (http://m.mobiletag.com/)
Lynkee Reader (http://m.lynkee.com/)
NeoReader (http://get.neoreader.com/)
ScanLife (http://www.getscanlife.com/)
i-nigma Reader(http://www.i-nigma.mobi/)
KAYWA Reader (http://reader.kaywa.com/)
SnapMaze (http://mobile.snapmaze.com/jar/)
QuickMark (http://www.quickmark.com.tw/En/basic/downloadMain.asp)

4.8.8 Application of QR Code in Libraries: Virtues & Value

Quick Response Code (QR) is an advantageous technology which converts needs of information from physical to virtual mode within a second. It is a comfortable and efficient way to go through a variety of information in any direction. It can effectively provide appropriate context and location to the users. Application of Quick Response codes in many fields other than initial factory is fast growing across the world. From

commercial tracking to store product labeling, entertainment, library & information services, and in applications aimed at smartphone use. Users of smartphone may open URL and receive text after scanning QR codes.

QR code as a new technology trend, it application in library and information service delivery is necessary, especially to the its' platform that generate an opportunity to leverage the way people access right information in a fast way, anywhere and anytime.

QR code operates in a nano second which fulfills Ranganthan's fourth law **'save the time of the reader'**. According to Adebayo (20??) to fulfil this law of Ranganthan, library professionals need to go through some advancement of technology to improve the services of library, the quality and the way to provide it is so necessary to adopt new applications. And that, 'already various technology applied in strengthen the serviceability of library activity, QR Code is one of them'. QR Reader application allows one to access some pre-written content such as a web site address, email address, details of things within the catalogue, phone numbers etc, which is a plus library and information service delivery.

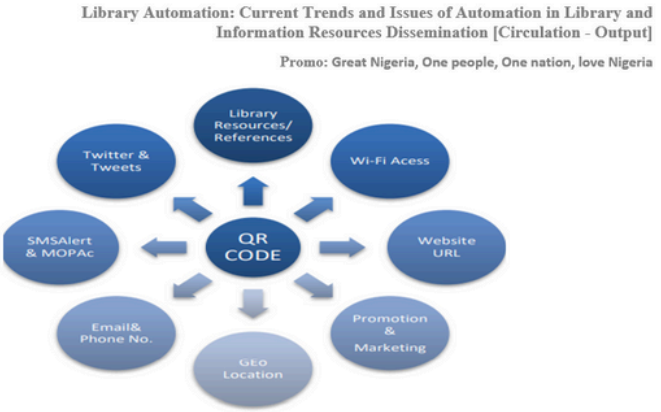
The present-day libraries need to be upgraded with new technologies so as to cope with modern techniques of informing users. Moreover, online catalogues to be supported with these new generation interfaces to reach the expectation of Mobile-Tech savvy library users in the mordern day. QR codes can be most effectively use to know more about the book from library before check-out by using the smart phone to scan the QR code to read Book review and rating by other readers on publisher sites. In addition to this, what is considered as "Cool Stuff" by modern day advertisers and consumers with the use of QR codes is also attainable with the application of QR codes in libraries especially in intimating users' available resources and services. Advertising of library resources and services is essential to create the awareness amongst the library users. Lack of informing the library users may make users not aware of the existence of the library resources and services, likewise non use of the resources and services, and overall law or non patronage of the library. In spite of all these, quick response codes can be used by the libraries to:

- Ø Promote library & information resources, services and activities,
- Ø Create needs for information and satisfaction of the needs,
- Ø Improve information dissemination,
- Ø Effectively connect with user community, and
- Ø Manage information explosion.

4.8.9 The Technology of QR Code in Libraries

Quick Response (QR) code is a new technology manifesting in the libraries. There are several applications to use QR code in library and information science. It is one such technology to which caters for the user requirements of providing access to resources through mobile phones and other portable devices. According to Adebayo (2013) in

recent times many educational institutions are willing to apply this technology and some has already used. The attraction is as a result of factual features of QR codes beneficial to library services. These are highlight of some features of QR Code which are beneficial for library services culled from Adebayo (20??):



➢ **Library Websites:** now a day it is very difficult to remember having different URL's for different purposes. So, one has to create and scan QR Code that will automatically access to your mobile, and then even if it is changes later on URL of the library website, it is automatically reads to the new one without changing of QR Code

➢ **Multi URLs:** This can be used for URL of different purposes very prominently that link to the main websites and access more advanced information.

➢ **Library Contact:** Applying this QR Code technology one can easily go through the direct contact of any particular library where they get email, phone no, address and their website. ➢ **Full text databases:** It can be possible by using QR Code, just to scan it and accordingly what you need, you receive it without any hindrance.

➢ **Scan & download article file**: If one can find or want any particular article, request librarian to send only one QR Code, you will receive full text article in your mobile.

➢ **Bibliographic databases:** According to the availability of resources, if any user asks for databases, they can just conveniently scan QR Code and undoubtedly get direct link to databases. It will easily come to your mobile.

➢ **E-books**: In addition to physical books, e-books can be accessed on mobile phone using QR Code. It will display in the devices which are subscribed by respective education institution, just to scan it, read and download it.

➢ **E- Text book**: If any users want to browse text book which are available, just go through the particular hyperlink, whatever they choose, interest it just scans the code read & download it.

➢ **E-Thesis: /E-dissertations:** QR Code has the ability to access additional link for thesis and dissertations according to their user needs.

➢ **Old Question Paper & study material**: The list of Question paper and study material on user mobile phone, it will display to mobile devices.

➢ **Library handbook:** One can automatically download the pdf file, which can be accessed from home also by using QR Code.

➢ **Library Catalogue:** By linking QR Code to the catalogue records, users can easily get the information regarding the particular item including call number, location etc.

➢ **Scan to mail:** With QR code it is very easy to send mail to librarian without typing any e-mail address in any service provider, just simply put on to composed and send it & to avoid tedious task.

➢ **Event QR Code**: It helps in promoting an event which will automatically press on to the leaflet, broachers of library event. It will come to mobile very enticingly without spending any money.

➢ **FB Pages:** There is no need to instruct the users for go different steps to and access the facebook page. So simply scan with QR Code and it will take you to the institutional pages directly and log in easily.

➢ **Twitter**: If any user scan QR Code through twitter, that code automatically concede to find someone and follow each other.

➢ **Social Blog**: social blog allows users to leveraging the key information followed by someone's blog and customize the profile of users.

➢ **SMS Reference:** Ask a librarian is basically SMS service is offering mobile patrons the ability to text their questions to librarian in real time manners.

➢ **Mobile number**: It is the better way that the librarian can create a QR Code with mobile no. So, whoever wants to talk they can scan it and automatically receive the particular mobile no.

➢ **Web Opac:** If you provide a particular QR Code for opening OPAC of library, connecting to the Web Opac become easy

➢ **Video Library:** If any institution can create a video by themselves, also make YouTube playlist video and a code with embedded with QR Code technology then any individuals can access it accordingly their purposes and saved it for later also.

➢ **Book Contents:** Visibility of content of a particular book is one of the innovative features.

➢ **Author's profile:** If a book is written by 3/4/5 authors then it is very difficult to write profile of such authors on to the small place but it is a easy to add comprehensive information link to brief bio data, authors profile etc through mobile code.

➢ **Call out**: If any user needs particular paragraph, theme, pictures, table from such library exhibitions, encyclopaedia, other resources or that type of theme of information

there is no need to open the particular website, by scan with QR Code it can easily acquire it read & download it and store for future purposes.

➢ **Library Exhibition:** Users can receive update information regarding library exhibition.

➢ Study Room Reservation:

➢ Library collection

➢ Journal Website Link:

➢ Print Journal/ article:

➢ Shelf Ends

4.8.10 The need for Quick Response (QR) Codes Application in Nigeria Libraries

Application of Quick Response codes in many fields other than initial factory services meant is fast growing across the world. From commercial tracking to store product labeling, entertainment, library & information services, and in applications aimed at smartphone use. The popularity of QR codes in information seeking is also growing rapidly in world businesses and world libraries. Nigeria libraries shouldn't be exceptional. Nowadays, mobile phones with built-in camera are widely used to recognize the QR Codes. This attraction is as a result of tremendous impacts derive from it usage and the efficiency of usage which Nigeria libraries need to avail their users.

Quick Response Code (QR) codes are superb in performing many functions advantageous to information accessing. QR code is an advantageous technology which converts needs of information from physical to virtual mode within a second. It is a comfortable and efficient way to go through a variety of information in any direction. It can effectively provide appropriate context and location to the users.

QR code as a new technology trend, its application in library and information service delivery is necessary, especially to its' platform that generate an opportunity to leverage the way people access right information in a fast way, anywhere and anytime. QR code operates in a nano second which fulfills Ranganthan's fourth law **'save the time of the reader'**. According to Adebayo (20??) to fulfil this law of Ranganthan, library professionals need to go through some advancement of technology to improve the services of library, the quality and the way to provide it is so necessary to adopt new applications. And that, 'already various technology applied in strengthen the serviceability of library activity, QR Code is one of them'.

Nigeria with of a population of over two hundred million and over eighty million smartphone users stand a good chance of leveraging the technology of QR codes in quick access to information. Moreover, majority numbers of smartphone users belongs to learned society that directly or indirectly deploy the services of libraries in their locations; hence they are part of user community of the Nigeria libraries. Therefore, the need for Nigeria libraries to seek ways to explore the various possibilities to reach these modern days' tech savvy library users, and this should be a matter of urgency. Nigeria

ibraries must change their marketing techniques according to their changing user community. Nigria libraries need these QR codes to market its products and services; to develop as information dissemination tool and a feedback mechanism that is free of cost, efficient and simple. Although the idea of marketing library products and services is not new, but marketing through QR codes will be a new and funfilled activity to the user community as well as for library professionals. Application of the QR code in library marketing will help to improve services for users and will enhance the reputation of library and information services and professionals. The current trend across the world libraries is leveraging of QR codes in information dissemination and Nigeria libraries should not be exceptional. They should make rigorous effort towards applying QR code in library services and application of other technologies fast coming.

Today QR code technology is in the early stage and will take some time to grasp the world to shift as a whole to the digital world. As internet has become a part of everybody live in the same way QR code will also become a necessity to access any particular information. Nigeria libraries should take a step to implement it in various areas and encourage their users to go through it as it is implemented to make users lives easier. QR code offers new ways for communicating and exchanging of information and knowledge with the help of ICT tools, and it is affecting revolutionary steps to changing the way information stored, retrieved and disseminated. Nigeria libraries must seek ways for automating their activities, creating dynamic website with useful features context and easily accessible links. Although Nigeria libraries are striving hard to cater the information needs of thier patrons but they must intensify effort in providing point of need assistance with just-in-time virtual and physical spaces. In this connection, QR code is a new technology which helps libraries to affordably connect its patron by context-sensitive without visually assaulting them. QR technology has the potential to connect patrons to information about its materials and services. It is free and easy to use as well as embed many types of media. Once a code written, the appearance ca also be chaged to include a picture or logo within the QR code. The usage of library sites are increased as the user don't need to type long URLs. All over the world the use of quick response (QR) codes in libraries is till developing, and this shall evolve with a varied and vast feature. According to MacLeod (2022) there have been effectively use of QR codes in libraries in Braitian, America, Asiato and other part of world to deliver information appropriate to the context and location of the user. Library exhibits that include a QR code link to songs, videos, Web sites, surveys, contests, etc. Codes in the library stacks/end caps or magazine/journal areas that point to online electronic holdings of print materials or related subject guides. Some of the important activities QR codes are applied in libraries related by Adebayo (2013) are as follows:

- Link to website
- Link to library e- resources
- Easy access to previous year question papers
- Library Audio Tour

- Group study room scheduler
- Marketing /promotional material
- Linking from print to electronic journals holdings
- Providing an electronic alternative to physical books
- Promoting online audio-visual materials
- Embedding video help
- Bringing external resources into library
- Finding appropriate help
- Taking the catalogue record with you
- Seat reservations, and
- Wi-fi proper utilization

Furthermore, benefits of QR code applications to library services are some motivational factors that would pull libraries and Nigeria libraries in particular. Some of these benefits include; ability to access Information quickly, user friendly, user participation, personalized service, time savings, location awareness, and above all, imitless access.

Conclusively, it is obvious that the present day's world barcode have become quite trendy because of their speed, accuracy and functionality. It is convenient and gaining popularity among users. Because of the gaining importance and popularity of QR code, its implementation to libraries is absolutely necessary. It is a modern technology that helps every reader to get the needed information. If libraries value their relevance as the gate way to information, they needed to be flexible in changing and adapting new technologies in their activities and services to create value added services and meet users needs. Certainly, QR code technology is easy to implement, free to use and growing in popularity. Incorporating it in to library services offers users a more interactive learning experience.

4.9 Bing-Chatbot & Applicability to Library & Information Services

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HighLights:

- « **The Bing-Chatbot**
- « **How to use Bing-Chatbot**
- « **How to use Bing-Chatbot for Literature Review**
- « **Application of Bing-Chatbotl to libraries services**

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4.9.1 Introduction

In the IT world and as the world becames more complex and interconnected, the demand for new technologies that assist in accomplishment of tasks increases. In academic circles, educators, researchers and students always seeking for easy and better ways of accomplishing tasks, and this is achieved through the use of appropriate technology that facilitate job execution. One of the most critical exercises executed in academic circle is research. In the academic world, educators and researchers are always seeking ways to improve their research, writing, and critical thinking skills. One tool that can assist in this exercise is the Bing-Chatbot.

4.9.2 The Tool 'BING-CHATBOT'

Bing-Chatbot is a conversational Artificial Intelligence tool that uses natural language processing to answer queries and provide information. It answers queries presented to it and provide users with information required with it. The use of Bing-Chatbot tool is an efficient and fun way to get quick answers to questions without having to do extensive research in finding answers to the questions or roving for the answers. Bing-Chatbot is a fascinating tool that help in accomplishing literature review in research. Libraries can use the tool to assist researchers in accomplishing literature review. Researchers turn to the libraries with the tedious task of finding literature sources to be review for new research, Bing-Chatbot is a tool that can be deployed to easily accomplish this task. It is an ultimate tool for accelerating literature review process. According to Abdulhamid (2023):

In today's fast-paced academic world, researchers are constantly seeking innovative way to optimize their workflow and produce high-quality research in the shortest time possible. One of the key challenges in conducting research is performing a comprehensive literature review. This process can be time consuming and daunting, especially when dealing with many sources. However, with the advent of modern technology, such as Bing-Chatbot, this process can now be streamlined and simplified.

4.9.3 How to use BING-CHATBOT

To use Bing-Chatbot is easy and fascinating. In a simple way, here step-by-step descriptive guide on how to get started with Bing-Chatbot:

· **Create a Microsoft Account to get started**

The use of Bing-Chatbot for the Bigginers that have no existing Microsoft account such as Hotmail or Outlook is to create an account. To create an account goes to any of these websites; www.hotmail.com or www.outlook.com.

· **Download Edge-Browser on device**

The use of Bing-Chatbot required Edge-Browser. Thus, to use Bing-Chatbot, one must first install the Edge browser on the device to be used. To do this, go to https://www.Microsoft.com/en-us/edge/download and download the appropriate version for the device. Strictly follow the instructions to install the browser.

· **Sign in with the Microsoft Account to access features of Bing-Chatbot**

Once the Edge-browser installed Singh in with the Microsoft account. To do this, click 'Singh in' button on top of the right corner of the page, and this will allow access to all features of Bing-Chatbot.

· **Click on 'Chat' to open the Bing-Chatbot interface**

When one has Sign in, 'Chat' button shall sight on top of the right corner of the page, click on that to open the Bing-Chatbot interface.

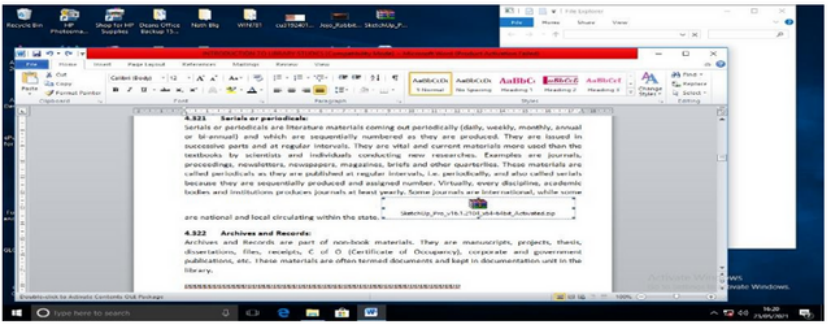
· **Choose a tone to use for the query/conversations**

When the Bing-Chatbot interface opened, one can choose the tone to use for the query or conversations at his liberty. Bing-Chatbot has three modes and they are;

1. *More Creative:* This mode is creative; more imaginative, entertaining, and engaging. But for the fact that it is creative, accuracy or logic may be fufeited for creativity which is a short. However, this mode can generate content such as poems, stories, images, etc.
2. *More Balanced:* Unlike more creative mode, more balanced mode balances accuracy and creativity thereby providing informative and interesting responses with degree of accuracy. Thus, it is the default mode of for Bing-Chatbot.
3. *More Precise:* This is more factual, logical, and concise. More Precise mode concentrates on accurate and relevant provision of information without embellishing (beautification) or digressing (out of point) but less engaging and entertaining than other modes aforementioned.

The selection of the tone is guided by suitability of the tone to the needs, thus, users can choose the tone that best suits their needs of getting quick answers to their questions. Bing-Chatbot is an ally to finding quick answers to questions, and an ultimate tool for accelerating literature review when conducting research. It can be used to summarise research papers or reports easily, quickly, and smartly.

4.9.4 How to use BING-CHATBOT for Literature Review



Before getting sterted with the use of Bing-Chatbot for literature review, the user should have a good grasp of the basics and techniques of getting started with the platform. When this is assured, the steps below can be followed in making review of the literature using Bing-Chatbot:

- **Create Literature Review Matrix using an Excel or Google sheet**

The beginning of the use of Bing-Chatbot for literature review is to create literature review matrix using an Excel or Google sheet to document the input receive from the chartbot. The following headings be included in the matrix; authors, title, publication type (journal, conference), name of the journal/conference, year, purpose, argument and perspectives, methodology, potential bias and limitations of the method, findings, research landscape, implications, gaps, strengths and limitations, recommendations, and reflections (Abdulhamid, 2023). The use of matrix approach helps in identifying, organising, and analysing literature relevant to research topic. It also helps in the evaluation of sources and determine contribution to the field.

- **Download or open the research paper**

Having the matrix in place, download or open the research paper and summarise it. There are two ways to do that. You either download the PDF copy of the paper or opening the paper directly from the web but ensure having full access to the paper or open it on the Edge browser.

- **Open Bing-Chatbot by clicking on the 'Chat' icon**

Open Bing-Chatbot to summarise the paper. To open Bing-Chatbot, click on the 'Chat' icon on top of the page at the right corner. The Chatbot will open alongside the research paper.

· **Use Bing-Chatbot to summarise information**

Ask the Bing-Chatbot to summarise information in this way:

"Can you please create a table that includes the authors, title, publication type (journal, conference), name of the journal/conference, and year for the document that is currently opened on Edge browser?" than wait for the response. As it responded, quickly go to the next level below.

· **Transfer content to the matrix**

Use the copy button to transfer the summarised information to the Excel or Google Sheet created earlier and move to the next level to obtain more refined feedback.

· **Ask Bing-Chatbot more nuanced questions**

In an effort of obtaining more refined feedback from the Bing-Chatbot, ask the following questions in this order:

§ What is the research question or problem that this study aims to address?

§ What are the main arguments and perspectives in literature related to this topic?

§ How does study contribute to the existing literature?

§ What is the methodology used by the author to conduct the research?

§ Are there any potential bases or limitations in the study's design or data collection?

§ What are the key findings of the research?

§ What are the strengths and limitations of studying?

§ How does this study fit into broader research landscape on this topic?

§ What are the gaps and areas for feature research that the study highlights?

§ How does this study relate to my own research interests and questions?

* Culled from Abdulhamid (2023).

When these are done, copy the input provided by Bing-Chatbot and captured into the corresponding heading box of the Matrix table created earlier. At this point, one is done with summarising key points of the paper. For other papers, follow the same pattern to review them.

4.9.5 Application of Bing-Chatbot To Libraries Services

From what have been said so far, it is evident that Bing-Chatbot is one of the useful tools for facilitating research because it is a useful tool for streamlining literature review process. Leveraging modern technology such as Bing-Chatbot, researchers can optimise workflow and produce high-quality research within a short period. However, As libraries are partners in academic exercises, particularly in conducting researches, and most especially literature reviews, libraries also need to leverage QR technology to support the researchers turning up to them.

Issues of innovations are in frontier in library & information service delivery. Libraries look for trending technologies applicable to them to improve services that drawn attention of patrons. Libraries of today are innovative and are fast in tracking new technologies. One top computer technology related to the library and libraries should imbibe and adopt to improve service delivery is QR codes. This technology is named QR (Quick Response) because it link users with information required quickly,

similar to the prctices in the libraries Quick Response code are not specifically meant for the libraries but in the same dirrection with the libraries. It would be of wise decision libraries familiar with it and apply it to more uses in satisfying users.

4.10 Blended Learning and the Library & Information Services

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HighLights:

« **Blended learning Concept**

« **The Impacts of Blended Learning**

« **Review of the use of Blended Learning**

« **Digital Library Services and Blended Learning Support: An Empirical Study of Libraries of Niger State - Nigeria.**

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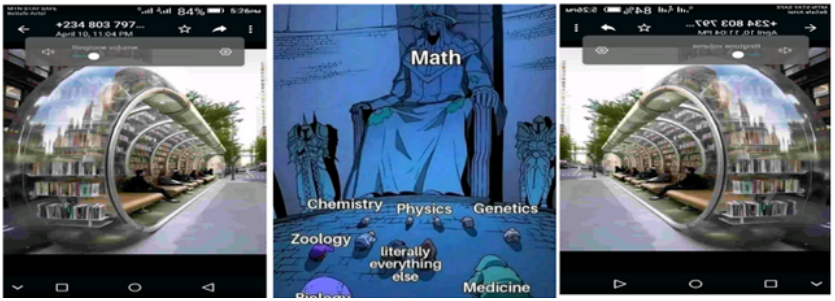
4.10.1 Blended learning Concept



Blended learning is an emerging concept, an interactive learning experience, and a trend in the circle of knowledge seeking (education) which involves libraries. Indeed, libraries are part of the stakeholders in education and should be involve in the affairs of education. Blended Learning is currently major concern in most institutions and a concern in the libraries. It is in forefront in most institutions across the world and the libraries also playing vital role in this direction. In Nigeria, recent conferences of library bodies captured issues of blended learning. Specifically, the 2022 conference of NLA River state chapter captured it among sub-themes of the conference and got attention of librarians across the country. The writer also participated in the conference and presented a paper that is forwarded below the chapter.

Blended learning has emerged as the latest educational programme making impact in present day classroom teachings. At all levels of education, primary, secondary and tertiary, blended learning is used to bring the digital world and in-class teaching together. Blended learning signifies the use of technology, especially information technology, in support of classroom teachings. According to William (2019) blended learning uses technology to combine in-class and ou-of-class learning, maximising the educational impact for students as a result.

4.10.2 The Impacts of Blended Learning

The tremendous impacts of blended learning are gradually known to educationists as acceptability of blended learning by educationists keeps rising. Blended learning while retaining the traditional student-teacher format breaks the 'one-way conventional teaching format' to 'multiple formats', the combination of conventional and nonconventional (virtuality). It has taken education beyond the physical classroom and allowing students to learn at their pace, anytime, anywhere.

Blended learning has redefined the role of the educators (instructors and supporters in learning exercise), offering those more flexible delivery options, depending on need and capabilities of the learners. This trend, according to William (2019) means educators can focus on student understanding, rather than the delivery method itself.

Long ago, learning out of classroom is an exercise always encouraged; actualisation of this is more and better now with the advent of digital technology. The recent explosion in digital technology opens doors for engaging learners and this means that teaching can now be far more engaging.

Jeff Rubenstein, the VP Product-Learnig & Collaboration Video Solution Company, Kaltura, speaking on how blended learning is used in and out of present day's classrooms said:

Generally speaking, in schools, more and more of the content delivery is being done via rich media and often on personal devices. In universities, students are contributing more content of their own, both for collaborating with each other for doing projects, and for assessment purposes.

As so much of modern work is now digital, it's increasingly important that students learn how to be digital creators.

The benefit of combining traditional teaching and technology is enormous. It is used to meet the preferred and appropriate learning style of learners as well as supporting instructors (teachers). Technology if well used, maximise physical contact (face-to-face) of teachers with students (instructors with learners) and help them to design programmes or courses that allow more flexible delivery with the use of media. Ultimately, teaching/learning is facilitating when technology used to support it, and that help learners assimilate lesson quickly. Technology is an ally that truly enhances learning for ultimate benefit of students so long as instructors choose to adopt it in teaching process. Flipped classrooms, where students are giving the opportunities of watching lecture films before real classroom participation is quite example of blended learning technique that could be practice as motivational factor to learning. But ahead of this, and in the interest of real practice of blended learning, highly relational-oriented programmes be offered online and offline to support learning. Learners should be empowered with the use of digital tools because they are beneficial to learners. Specifically, tremendous benefits attachés blended learning. In the Spectator Index (@spectatorindex), ten benefits itemised as the drivers of blended learning, they are;

1. Improve ability to personalise learning
2. Potential for individual progress
3. Improve student engagement and motivation
4. Shift to online stresources starting in 2015
5. Need to ended time and stretch resources
6. Potential to ended the reach of effective teachers
7. Ability to improve working conditions
8. Decrease device costs
9. Student & parent adoption of apps
10. Interest in narrowing the digital divide.

4.10.3 Review of The Use Of Blended Learning

Blended learning is a global practice. Far before the practices of blended learning in Nigeria other countries especially UK, USA and Chaina have started it and gone far. In these countries blended learning proved positive. Use of blended learning in universities and major institutions in these countries is at th top gear.

In UK, the University of West of England (UWE) has been rolling out blended learning across a range of courses. Narrating the story of the university on the use of online environment to enhance learning the head of Digital Learning at University, Manuel Frutos-Perez said:

Students enhance their work-based skills during on-the-job training, which is based on the appropriate professional competencies. The work-based training is augmented with blended

learning to ensure understanding and to enable students to apply this knowledge in practice.

Interactive online learning resources and live remote lectures are obtainable in this university.

The University of Derby is also another institution leading way in the practices of blended learning. Lecturers in this university use blended learning to engage their students especially of postgraduates. One of the lectures, Dan Williams, an acting programme leader for the Post-14 PGCE at the university, uses blended learning as part of his course. Sharing experiences of the use of blended learning to benefit learning outcome of students, he said:

I modelled the blended (blended learning) approach to trainees by taking them to work in pairs on an 'applied' activity, whereby they analysed a range of technologies to determine the potential effectiveness of each in their own context. This involved the completion of a Google document, whereby each learner could critique peer examples and suggest ways in which the theory might be better applied to support learners.

Coventry University is also doing well in blended learning application. At the university, Advance Manufacturing & Engineering (AME), an organisation that was set up as collaboration between the university and a manufacturing company (Unipart) to inspire the up-coming generation of egineers, uses blended learning approach to address some issues in preparing students for employability. On this matter, the Director of this organisation, Carl Perrin, comments:

Graduate engineers were just not industry-ready and that was causing a big issue for employers. The answer was a blended-learning approach whereby our graduates would do 30% theory in the classroom using digital technology, with the rest of the time spent on applying the knowledge they were gaining direct on to practical situations.

We believe that when AME students leave us they are one year ahead of their peers, despite studying for the same length of time.

In another narration on the uses of blended learning and support to education, Rishi Kumar, Recruitment Director of GISMA Business School shares his thoughts:

Many universities all over the world have started providing access to online resources and reading materials online where students do not even have to physically attend the school. Personally, I have taken many online courses and the key benefit is the flexibility and the ability to learn at your own speed. The fact that you do not need to be physically present and yet, you could graduate with a 1st class degree from a top university in the UK, Australia or USA shows the influence of technology on education and this influence will only grow in due time.

A blended learning practice in Nigeria is also commendable. Nigeria Universities and other institutions and organisations in Nigeria are not left out in this drive.

One major thing that booted the acceptance of blended learning in most part of the world and Nigeria in particular is the outbreak of corunavirus (covid-19) in 2019. At the event of covid-19, most institutions and outfits were closed down. Educational institutes came to adopt information technology gadget to reach out. And when these institutes where reopened aftermath of covid-19 there were continuation of online classes. This

was supported by the libraries. Although libraries long a go and before the issue of covid-19, involve in online services but it was intensified at the moment of covid to support institutions in reaching out to the students. It is believed that this was the factor that made than library conferences to captured issues of blended learning.

Covid-19 resulted to the non-intake (non-admitting) of the students in most institutions in Nigeria and combination of sets of admission at the later years. This caused overpopulation of in-take students in institutions, and majority of the institutions partially going by online teaching - a blended learning. Libraries in these institutions made efforts and still making efforts in supporting this action.

In support of blended learning many recent library conferences captured issues of blended learning. This was to deploy more ways of bettering support services to blended learning. Specifically, the 2022 conference of NLA River state chapter was an eye-saw. The conference captured blended learning support services amongst important sub-themes and got serious attention of librarians across the country. The writer also participated in the conference and presented a paper that is forwarded below.

4.10.4 Digital Library Services and Blended Learning Support: An Empirical Study of Libraries of State Tertiary Institutions in Niger State – Nigeria

4.10.4.1 Abstract

State owned tertiary institutions in Niger state's libraries began to use ICTs in the early 2000s. As at that time there was little progress in the use of ICT in those libraries. But today there has been considerable progress particularly in three famous state institutions, viz; Niger state College of Education, Minna, Niger State Polytechnic, Zungeru and Niger State College of Agriculture, Mokwa which are the main concern of this study. The purpose was to determine the provision of Digital Library Services and Blended Learning Supports in these libraries and to discover major constraints faced and to proffer solutions to overcome such constraints. Thus, eight research questions guided

the study, while a descriptive survey research design was employed. A population of 30 librarians was used through simple random sampling. Structured questionnaire was used for data collection. The data collected was analyzed and presented in frequency table with proportion (ratio or percentage) of each institutional library highlighted. However, the findings revealed that most libraries in these institutions use computers as stand-alone devices whose applications are confined to bibliographic database maintenance and word processing. While some have an online connection and are providing external resource sharing on a limited scale. Most libraries use CDS/ISIS software to create bibliographic databases, and for acquisitions, cataloguing, and serials control. Although there was remarkable progress to the provision of digital services in most libraries, but some of the services are inconsistent. A number of problems contributed to this, they include; lack of adequate financial support, long-term planning, and absence of local resources among others. Thus, the paper recommended for provision of adequate fund and infrastructure, long-term planning for digital services provision, and full support for local resources development.

Keywords: Digital library service blended learning, Niger state.

4.10.4.2 Introduction

Digital Library Services and Blended Learning Support is the boner in most institutions across the world and Nigeria libraries also playing vital role in this direction. Niger state in Nigeria, it owned tertiary institutions' libraries began to use ICTs in the early 2000s. As at that time there was little progress in the use of ICT in those libraries. But today there has been considerable progress particularly in three famous state institutions, viz; Niger state College of Education, Minna, Niger State Polytechnic, Zungeru and Niger State College of Agriculture, Mokwa which are the main concern of this study. The accelerated adoption and use of Information and Communication Technology (ICT) has resulted in the globalization of information and knowledge resources. Bibliographic databases, full-text documents, and digital library collections are always available to users. This development cannot be said without hurdles, either technical or human factor, particularly in Niger state. Various similar studies before this, lamented different challenges to the use of ICT particularly in the libraries. Bangladesh is one of the few countries of the world which began to adopt information technologies in 1964, but today it is still faced with numbers of challenges. The recent study carried out by Nazmu and Shiyi (2022) discovered a number of problems to the application and use of ICT in the libraries of Bangladesh which include lack of skilled manpower, shared initiatives, financial support, infrastructure, and administrative barriers. In another study carried out on ICT utilization of public libraries of Niger Republic it was noted that lack of knowledge of technological developments has created a significant barrier to the installation or development of ICT facilities in the libraries. That, most library professionals in these libraries do not have adequate knowledge regarding computer applications and automation, a situation that hinders utilization of ICT in the area [3].

Back home – Nigeria, the studies of Zurka (2021) on utilization of ICT in academic libraries of tertiary institutions in north-central states reported inadequate financial support as major impediment that made application of ICT more difficult, and that this bows down to poor infrastructures and breakage in service provision. Moreover, the research carried out by Hamza (2021) established a number of challenges to the use of ICT in Kebbi state which include; failure to provide plans for ICT utilization, reluctance of library personnel to accept new technologies, in-adequate funding and infrastructures. In Niger state, the problem of ITC utilization is much more acute in public libraries than academic libraries. This was noted by Ismail (2020) in the research conducted on application of ICT in selected libraries in Niger state. The research discovered inadequate physical facilities, telecommunications infrastructure, and interrupted power supply as major impediments to the application and use ICT in selected libraries. Although, the research noted acceleration and good usage of ICT in digital service provision in academic libraries of tertiary institutions of Niger state but this includes both state and federal institutional libraries. However, this dramatic event in Niger state call for scientific study of the situation especially in state owned tertiary institutional libraries where use of ICT is on top gear in order to ascertain the level of progress made in the utilization of ICT for provision of digital library services and blended learning supports in these libraries and to discover major constraints faced and to proffer solutions to overcome such constraints. These libraries include Niger state College of Education, Minna library, Niger State Polytechnic, Zungeru library and Niger State College of Agriculture, Mokwa library. The choice of the area was motivated as a matter of fact that a similar study in the area has not been carried out at this particular period as it was done in other areas of Nigeria. More so, the researcher is already familiar with the area and would find it easy to access the chosen respondents.

4.10.4.3 Purpose of the study

The purpose of this study was to determine the provision of digital library services and blended learning supports in the state owned tertiary institution libraries in Niger state and to discover major constraints faced and to proffer solutions to the constraints. Specifically, the research was to identify;

§ Types of ICT resources used in providing digital library services and blended learning support in the state-owned tertiary institution libraries in Niger state

§ Number of Records in Database in the libraries

§ Library Software used in the libraries

§ Internet Access Technologies in the libraries

§ Digital Library-Based Activities performed in the libraries

§ Digital Library-Based Services offer in the libraries

§ Challenges to the provision of digital library services and blended learning support in the libraries, and

§ Strategies for improving provision of digital library services and blended learning support in the libraries.

4.10.4.4. Research Questions

1. What type of ICT Resources used in providing digital library services and blended learning support in the state owned tertiary institution libraries in Niger state?
2. What number of Records in Database in the libraries?
3. What type of Library Software used in the libraries?
4. What type of Internet Access Technologies used in the libraries?
5. What type of Digital Library-Based Activities Performed in the libraries?
6. What type of Digital Library-Based Services offer in the libraries?
7. What are the challenges to the provision of digital library services and blended learning support in the libraries?
8. What are the strategies for improving provision of digital library services and blended learning support in the libraries?

4.10.4.5 Methodology

Descriptive survey research design was used in conducting this research. In descriptive research, data are usually collected, organized, and analyzed and then described as they exist (natural setting) without interfering with them. Therefore, the design was deemed fit for the study as the study was to describe the real situation with regard to the use of ICT in provision of digital library services and blended learning supports in the state owned tertiary institution libraries in Niger state. More so, the choice of this design was informed by its successful adoption on empirical study of the Use of ICT in Selected libraries in Bangladesh by Nazmu and Shiyi (2022). A population of about 30 librarians was used. Using simple random sampling technique, sample size of 10 librarians from each of institutional library was arrived at. A Structured questionnaire was used for data collection, supplemented with field observation and unstructured interview. These instruments were face validated by three senior researchers in the field of Library and Information Science in the state. The inputs of these experts were incorporated and used for the study. The research instruments were administered by the researchers with the help of three research assistants, one from each institute.

The data collected was analyzed and presented in frequency table with proportion (ratio or percentage) of each state highlighted. Moreover, the additional information obtained through field observation and unstructured interview in the field were narrated in prose substantiating data collected through questionnaire.

4.10.4.6 The Results

4.10.4.6.1 Type of ICT Resources used in the state owned tertiary institution libraries in Niger state

The state owned tertiary institution libraries in Niger state use various types of ICT resources to ensure efficiency of the library activities and to support blended learning. The table below shows the types of ICT resources used in the libraries surveyed.

Table 1: ICT Resources Used in the Libraries

S/N	ICT facilities	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa	Total
1	Computers (Cps)	204	152	118	474
2	Cps connected to Internet	155	104	43	302
3	CD-ROMs	63	61	32	156
4	Audio Cassettes	00	03	00	003
5	Video Cassettes	00	00	00	000
6	Scanners	02	02	01	05
7	Printers	03	02	01	06
8	Photocopiers	02	01	01	04
Total per Library		**429**	**325**	**196**	**950**

The table above tells that Niger State College of Education Minna library has higher number of ICT resources than others which signifies that it uses more number of ICT resources than others. This is followed by Niger State Polytechnic Zungeru. The library of Niger State College of Agriculture Mokwa has lower number of ICT resources among the libraries surveyed which signifies that the library uses less number of ICT resources when compared with other libraries. It would also be learnt that total number of nine hundred and fifty ICT resources are available in all of the libraries surveyed.

4.10.4.6.2 Number of records in database in the state owned tertiary institution libraries in Niger state

The following table reveals the number of database records and its ratio against total library collection.

Table 2: Number of Records in Database in the Libraries

S/N	Library collection	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa	Total
1	Total library collection				

	(print and non-print)	742,186	706,251	135,437	1,583,874
2	No. of non-print (Database resources)	81,650	62,414	8,122	152,186
3	Ratio between total no. of records and no. of records in database	0.11	0.09	0.06	0.10

In the table two above, it would be learnt that all the surveyed libraries have less number of database records (soft copies of materials) than print materials (hard copies) when the number of database records compared with the total library collection because none of the libraries ratio reached one. Niger State College of Education Minna library still top the list followed by Niger State Polytechnic Zungeru. The library of Niger State College of Agriculture Mokwa also has lower number of records in the database than other libraries.

4.10.4.6.3 Types of library software used in the state owned tertiary institution libraries in Niger state

The following table shows the software used by the libraries surveyed:

Table 3: Library Software Used in the Libraries

S/N	Library Software	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa	Total
1	Library Management Software (locally developed)	-	-	-	00
2	CDS/ISIS (compterised Documentation Services/Integrated Set of Information System) (For indexing journals and newspapers)	√	√	-	02
3	Library MIS (Based upon CDS/ISIS)	√	-	√	02
4	GLAS (Graphical Library Automation System)	-	-	-	00
5	Alice for windows	√	√	√	03

Total per Library	03	02	02	07

Note: the dash indicates no response which means not used.

Table three above indicates that only Niger State College of Education Minna library used three different types of software including Alice for windows while others use two. GLAS (Graphical Library Automation System) and locally developed Library Management Software are not used by all libraries but Alice is available in all.

4.10.4.6.4 Internet access technologies used in the state owned tertiary institution libraries in Niger state

Table 4: Internet Technologies Used in the Libraries

S/N	Access points	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa
1	Availability of Internet Infrastructure	√	√	√
2	Number of computers (i.e. access points)	155	104	43
3	Average users per day	250	170	80
Ratio between access points and average no. of users		0.62	0.61	0.53

Table four reflect availability of Internet infrastructure in all the surveyed libraries, and also tells that access points in these libraries are far below the demand of the users because the number of computers (i.e. access points) in all libraries are not up to the average number of users per day. Going by the ratio above, two or more users are to share a point at a time, therefore, lot of users would have to wait - lining up to access for a point.

4.10.4.6.5 Digital library-based activities performed in the state owned tertiary institution libraries in Niger state

Table 5: Digital library-based Activities Performed in the Libraries

S/N	Digital library-based Activities	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa

1	Data Processing	√	√	√
2	Communication	√	√	√
3	Circulation	√	-	√
4	Cataloguing	√	√	√
5	Bibliography	√	√	√
6	Serial control	√	-	-
7	Preparing in house database	√	√	-
Total per Library		**7**	**5**	**5**

Note: the dash indicates no response which means not available.

In table five, Niger State College of Education Minna library top the list of the activities performed by computer and related technologies while Niger State Polytechnic Zungeru and Niger State College of Agriculture Mokwa libraries have the least in the table. In the table, it is also clear that all libraries use computers for data processing, cataloguing and bibliographic analysis and preparation.

4.10.4.6.6 Digital library-based services offer in the state owned tertiary institution libraries in Niger state

Table 6: Digital library-based Services in the Libraries

S/N	Digital library-based services	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa
1	CD-ROM Searching	√	-	-
2	Online Searching	√	√	√
3	Online Networking	√	√	√
4	Online Information Service	√	√	-
5	Online Reservation Service	√	√	-
6	Database Searching Service	√	√	√
7	News Clipping Scanning Service	-	-	-
8	Photocopying Service	√	√	√

Note: the dash indicates no response which means not available.

In the table above it would be understood that online networking and information services and database searching service are provided by all libraries while none of the libraries provide News Clipping Scanning Service. Also, photocopying service is available in all libraries while CD-ROM searching available only in Niger State College of Education Minna library. Niger State College of Education Minna library top the list of ICT-based Library Services provided by the surveyed libraries followed by Niger State Polytechnic Zungeru library and Niger State College of Agriculture Mokwa library.

4.10.4.6.7 Challenges to the provision of digital library services and blended learning support in the libraries

Table 7: Challenges to the Use of ICT in the Libraries

S/N	Challenges	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa
1	Administrative barriers	√	√	-
2	Psychological Barriers	-	√	√
3	Lack of long-term planning	√	√	√
4	Lack of E-Resources Selection Policy	-	√	√
5	Lack of financial support	√	√	√
6	Lack of infrastructure	-	-	√
7	Lack of ICT resources	-	√	√
8	Absence of local resources	√	√	√
9	Lack of Networks	-	-	-
10	Lack of skilled manpower	-	-	√
11	Lack of shared initiatives	-	√	√

12	Lack of ICT Training Programs	-	√	√
Total per Library		**4**	**8**	**10**

Note: the dash indicates no response which means not agreed.

Table seven indicates the prevalence of the challenges of lack of financial support, long-term planning, and absence of local resources among others as these were agreed by all libraries. The next to these are lack of administrative barriers, psychological barrier, e-resources selection policy, adequate ICT resources, shared initiative, training and retrainings.

From the table, there is indication of the availability of network connectives in all institutions because non of the institutions indicated lack of network connectivity.

4.10.4.6.8 Strategies for improving provision of digital library services and blended learning support in the libraries

Table 8: Strategies for Improving the Use of ICT in the Libraries

S/N	Strategies	Institutional libraries: Niger State College of Education Minna	Niger State Polytechnic Zungeru	Niger State College of Agriculture Mokwa
1	Removal of Administrative barriers	√	√	√
2	Sensitization on importance of ICT	√	√	√
3	Provision of long-term plans on ICT	√	√	√
4	Provision of E-Resources Selection Policy	-	√	√
5	Provision of adequate fund	√	√	√
6	Provision of adequate infrastructure	√	√	-
7	Provision of adequate ICT resources	-	√	√

8	Provision of local resources	√	√	√
9	Provision of Networks	-	√	-
10	Provision of skilled manpower	√	√	√
11	Encouraging shared initiatives	√	√	√
12	Provision of ICT Training Programs	√	√	√
Total per Library		**9**	**12**	**10**

Note: the dash indicates no response which means not priority.

Table eight above indicates acceptance of all outlined strategies for improving the use of ICT in the libraries except item seven (Provision of network) which is an impression of availability of network connectivities in the area; such is not a problem to them.

1.10.4.7. Discussion

Digital Library Services and Blended Learning Support in state own tertiary institutions of Niger state is quite commendable weighing successes recorded within short period of time. In the recent, there is rapid change in ICT services provision in these libraries. In respect to the types of ICT equipment use in the libraries, the result shows that these libraries use various types of ICT equipment to ensure efficiency of the library activities and provision of support to blended learning. Niger State College of Education Minna has highest number of ICT resources than other libraries which signify that it uses more number of ICT resources in provision of support than other libraries. The library of Niger state College of Agriculture has the lowest number of ICT resources followed by Niger states Polytechnic, Zungeru which signifies that these libraries use less numbers of ICT resources compared to Niger State College of Education Minna library. This finding is inline with the claim of Enagi and Barau (2009) that College of Education, Minna uses more number of ICT resources than other state own institutions.

The state own instiinstitutions use different types of software including GLAS, locally developed software. Most libraries use CDS/ISIS software. This proves Zaradeen (2011) claim that most libraries of developing nations uses CDS/ISIS. With respect to number of records in database, all libraries have less number of records in database compared to the total library collection because none of the libraries ratio reaches one. This intensifies the narration of Tanimu (2017) that till today, number of hardcopies of materials in Niger state libraries surpass the number of soft copies.

Availability of internet infrastructure is not a problem in the libraries. Most of the libraries are connected to net but the number of access points is far below the demand of the users because the numbers of computers used to access data in almost all libraries are not up to the average number of users per day. More number of computers needs to be provided in these libraries to accommodate the needs of the users as internet plays a vital

role in libraries. Anthony (2017) buttressed that internet plays vita role in knowledge acquisition and should be freely provided to the citizens.

The activities performed by computer and related technologies in these libraries is generally commendable. This situation may be attributed to increase in the level of awareness of information technology in these areas which is in line with the claim of John (2013) that an increase in ICT awareness make people to increase usage of ICT. However, most libraries use computers for data processing and bibliographic analysis and for creating an in-house database in most cases.

Online information service and database searching service are top ICT services provided by all libraries. All Libraries admitted providing online reservation services. However, a library admitted providing news clipping scanning service. CD-ROM searching, online searching and photocopying services are provided by almost all libraries except few. Niger state Colleges of Education is pioneer institution in creation of bibliographic databases using microcomputers. This was before nowdisclosed in Enagi and Barau (2009). Most libraries, however, use computers as stand-alone devices whose applications are confined to bibliographic database maintenance and word processing. There is no single library that is fully automated. Some libraries are in the initial stages of the automation and networking process. Most libraries have an online connection and are providing external resource sharing on a limited scale. This is inline with Tanimu (2017) that there will be increase in external resource sharing by libraries as they increase efforts towards this.

The challenges admitted facing ICT utilization in the libraries are enormous. Lack of financial support, long-term planning, and absence of local resources among others prevail in the libraries, and this is what was found in the reports of some researches such as Tanimu (2017) and Enagi a d Barau (2009).

Moreover, the acceptance of all outlined strategies for improving the use of ICT in service provision in the libraries is an indication of readiness of these libraries in improving digital services provision.

4.10.4.8. Conclusion

Digital services provision in Niger state tertiary institutions' libraries is gathering momentum there is remarkable progress in the provision of digital services in most libraries, but some of the services are inconsistent. A number of problems contributed to this, they include; lack of adequate financial support, long-term planning, and absence of local resources among others. Therefore, the paper recommends for:

- § Provision of adequate fund and infrastructure for digital service delivery
- § Provision of long-term panning for digital service delivery and
- § Full support for local resources development.

4.10.5 Chapter Summary

This chapter coverscovers:

§ Library Networkings
§ Network Types
§ The Internet/Web
§ Online Storage & Virtual World
§ Database Management Systems (DBMS)
§ Types & values of database systems
§ Brief history of database systems
§ Functions of a DBMS
§ Virtual world: Database sharing
§ The influence of database system on library management
§ Digitalized Knowledge Management and Delivery: The New Innovative Delivery Strategies in Tune with 21st Century Requirements
§ Digital Resources values & applications
§ Digitization in libraries
§ Digitization Developments in Nigeria Libraries
§ New Innovative Delivery Strategies to Digitalized Knowledge
§ Other new technologies applicable in management and delivering digitalized knowledge in libraries
§ Enhancing Library and Information Management through the Use of Social-Media
§ Social-Media
§ Web 2.0 / Library 2.0
§ Essential elements of Library 2.0 suitable to present day libraries
§ Social media tools
§ Use of social Media tools for Enhancing Information dissemination
§ The concept of 4IR
§ Relations of 4IR Technologies with the Libraries
§ The 4IR Potentialities applicable in the Libraries
§ The Challenges of the 4IR application in the Libraries
§ The Prospects of the application of 4IR technologies in the Libraries
§ The Concept of QR codes
§ The Features of QR Codes
§ The Merits of QR Codes
§ The Functions of QR Codes
§ How to operate QR Codes
§ How to generate a code
§ How to acquire QR Code Readers
§ The virtues and values of the application of QR code in libraries

§ The technologies of QR Code in Libraries

§ The need for Quick Response (QR) codes application in Nigeria libraries

§ The concept of Bing-Chatbot

§ How to use Bing-Chatbot

§ How to use Bing-Chatbot for Literature Review

§ Importance of application of Bing-Chatbot to libraries services

§ The Concept of Blended learning

§ The Impacts of Blended Learning

§ The uses of Blended Learning in academic society

§ Key issues in Digital Library Services and Blended Learning Support provision in some tertiary institutions in Nigeria.

4.10.6 Evaluation

Describe the concept of Library Networkings

§ List types of Network

§ Indentify the structure of Internet/Web

§ Give account of online storage and virtual state of accessing information

§ Describe Database Management Systems (DBMS)

§ State types of database systems

§ Enumerate values of database systems

§ Narrate brief history of database systems

§ Express functions of a DBMS

§ Discuss the idea of virtuality in database sharing

§ Outline influences of database system on library management

§ Identify digital resources values & applications

§ Relate digitization developments in Nigeria Libraries

§ Identify new Innovative Delivery Strategies to Digitalized Knowledge

§ Mention social-media tools use in enhancing information delivery and overall library and information management

§ Describe the concept of Web 2.0 / Library 2.0

§ Identify essential elements of Library 2.0 suitable to present day libraries

§ Explain the meaning of 4IR

§ Relate 4IR Technologies with the Libraries

§ State 4IR Potentialities and applicability in the Libraries

§ Enumerate Challenges of the 4IR application in the Libraries

§ Write Prospects of the application of 4IR technologies in the Libraries

§ Explain the Concept of QR codes

§ List the Features of QR Codes

§ Enumerate the merits of QR Codes

§ State the Functions of QR Codes

§ Elucidate steps in using QR Codes

§ List steps in generating a code

§ Explain how to acquire QR Code Readers

§ State the virtues and values of the application of QR code in libraries

§ Itemise the technologies of QR Code in Libraries

§ Explain the need for Quick Response (QR) codes application in Nigeria libraries

§ Describe the Bing-Chatbot

§ Narrate how to use Bing-Chatbot

§ State how to use Bing-Chatbot for Literature Review

§ Draft importance of application of Bing-Chatbot to libraries services

§ Explain Blended learning Concept

§ List the Impacts of Blended Learning

§ Review the use of Blended Learning in academic society

§ Relate key issues in Digital Library Services and Blended Learning Support provision in some tertiary institutions in Nigeria.

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9

Chapter Five

Challenges and Prospects of Automation in Nigeria Libraries

5.1 Chapter Objectives

After reading this chapter readers should be able to:

1. List major challenges of automation in Nigeria libraries
2. Identify strategies to overcome challenges of automation in Nigeria libraries
3. Enumerate prospects of automation in Nigeria libraries

5.2 Chapter Introduction

In this chapter readers are introduced to:

- § Major challenges of automation in Nigeria libraries
- § Strategies to overcome challenges of automation in Nigeria libraries
- § Prospects of automation in Nigeria libraries

5.2.1 Challenges of Automation in Nigeria Libraries

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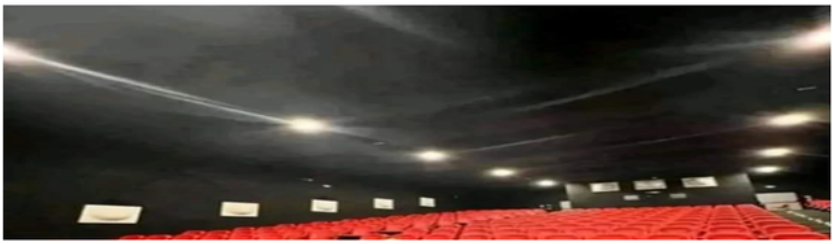

HighLights:

« **Managerial factor**
« **Personnel factor**
« **Equipment factor**
« **Environmental factor**
« **Regulatory factor**

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Automation is progressively taking hold in Nigerian libraries, and this is a constant process because libraries would want to work with the most recent technology to stay current. This implies that problems with library automation would keep arising, and the only way to deal with them would be to keep coming up with solutions.

In this chapter, there are five ways to look at the issues that library automation in Nigeria is currently facing:

§ Managerial factor
§ Personnel factor
§ Equipment factor
§ Environmental factor, and
§ Regulatory factor

1. **MAGERIAL FACTOR**

Many libraries in Nigeria are government owned. Thus, they depend on the budgetary of fund to function. Libraries of tertiary institutions that are indirectly owned by federal government, and those directly owned by the same government (national libraries) perform averagely in the offering of online services. But some deverse commendation because they are far ahead of others. However, the libraries own by either states or local governments are far left behind because of poor budgetary of fund to the libraries except few of them own by some state tertiary institutions benefiting from the treasury of Tertiary Education Trust Fund (TETFund) are performing averagely. The governments and managements of the state and local government libraries give not the desire attention to the libraries own to them. The worst are library managements and staff of these libraries which in most cases sitting idol waiting for intervention without initiating tangible efforts to draw attention of the government to their plights.

2. **personnel FACTOR**

Many of the challenges emanating from the personnel (staff) have been trashed in the preceding chapters, especially in the research reports presented at the end of each chapter. Notable are nonchalant attitude of the staff to the daily routines in automated settings, lack of initiation and the zeal to use initiations of colleagues and working together in the spirit of oneness. These are serious challenges causing setbacks in library networkings and general issues in library automation. Unless and until personnel of the libraries pay cogent attention to daily routines, having zeal to initiate new ideas, working with the new ideas and togetherness, reasonable progression would be achieved

in Nigeria libraries with regards to automation. Library personnel must keep to the ethics of the proffession (librarianship) to move ahead. Moreover, the personnel must imbibe the spirit of Godliness in executing tasks entrusted upon them. Just as it is said that "teachers' rewards are in heven" librarians should also look toward to this apart of emoluments enjoyed in this world.

3. **Equipment factor**

Access to sufficient equipment is a case in some libraries in Nigeria. Sufficiency in number of equipment to cater for automated library routines and strength of the equipment to accomplish expected task (functionality) are major challenges in the libraries. Hardwares are either obsolete or malfunctioning. Besides hardware, security of software is threatened by malicious attacks to cripple the system. Absence of computer security leads to corruption or loss of data, misuse or theft of information/identity, unauthorised use of information, and transmission of computer viruses that can cause breakdown of the system. Many of the security threats in automated settings today, particularly library networkings are spread over the internet. The commonest threats include:

§ **Vandals:** Application software or applets that cause destruction and loss of information.

§ **Viruses:** computer programs written by racketeering progmmer(s) in such a way that replicate themselves and infect computers when triggered by specific event or action.

§ **Trojan Horse Programs:** What appear to be harmless or useful software programs like games but harmful and dreading; a delivery vehicle for destructive code.

§ **Attacks:** exploitation of a flow in a computing system without the consent of system operator, and normally harmful. Attacks include gathering of data used to compromise networks (reconnaissance attacks), exploiting of network vulnerabilities to gain entry to e-mail, databases, and corporate networks (access attacks), and preventing access to computer system partly or entirely (denial focused vice attacks). Attack may occur through many ways. It may be through physical access (vandalism or theft of hardware, network monitoring of traffic), communication interception (identity spoofing, session hijacking, rerouting or alteration of messages), denials of services (interference with TCP/IP protocol, server software), intrusions (port scanning, buffer overflow, maliciousness), trapdoors (hidden in software programs), and social engineering (operator/user disclosure of confidential information out of ignorance or crock act). In some cases the operators or users when tipped deliberately disclose to hackers confidential security information to have access to organisation's lines and basses, especially if not working in the organisation anymore.

§ **Data Interception:** intercepting or altering of data packets being transmitted.

§ **Harking:** modifying computer hardware or software to accomplish a goal outside of the creator's original purpose. Harkers do this normally for financial benefits.

§ **Social Engineering:** to get hold of confidential network security information by crock or nontechnical means such as claiming to be officials for business or inquiry. Fraudsters often pose as officials and inquire confidential information to defraud network operators or users.

Effective security measures to guide against these threats are necessary to keep alive automated libraries. Some of the network security measures apart of physical protection of hardware and software include:

§ Effective management of network structure where routers, bridges and other devices used. Further more, network layout can be used to increase network security.

§ Firewalls implementation, configuration, management and monitoring.

§ Use of Intrusion Detection to determining when an intruder penetrated or attempted penetrating network.

§ Use of traps to delay intruders and prevent damage.

§ Use of passwords and different methods of storing and transmitting passwords, because variation of these methods can affect the security of the passwords and network. Further more, effective password policy should be adhered.

§ Various security tools should be used to check the security strength of the network and computers.

§ Effective use of virus protection to identify and remove viruses from computer systems and should be actively running on all computer systems on the network.

§ Cogent security policy that outline ways of using network and software, password policies, external connection policies, and other issues connected to this.

§ Versatility in security protocols; knowing various encryption protocols, their strength and weaknesses, and how they are best used help in making networks more secure and stable.

4. **Environmental factor**

Environmental factor is one of the major challenges of automation in Nigeria. Nigeria experience variation in weather - the short term state of the atmosphere at a specific time and place including temperature, relative humidity, cloud cover, precipitation, and wind that sometimes affect functionality of computers and networks. Hardware are prone to weather conditions especially when it is high. High temperature sometimes experienced in Nigeria affects functionality and durability of hardware. Network obstruction and fluctuation is a case during harsh weather condition. However, libraries where air-conditioning systems are put in place and properly functioning, effect of harsh weather condition is less or absolutely control. Efforts should be intensify in making available ACs in libraries to curtail threat pose by harsh weather condition. Proper erection, illumination, and ventilation of library structures to prevent inflow of dust particles during wind, and water vapours (mist, steam or fumes) during relative humidity, cloud cover, and precipitation, to avoid computer systems (hardware & software) from malfunctioning. More so, prevention of the library from all sorts of linkages during rains to avoids penetration of water to computer systems and damages.

5. Regulatory factor

Effective regulatory policy formation and implementation to library automation and Networkings is prelequisite in making meaningful progression in library automation. Effective regulatory policy formation and implementation to library automation and Networkings that covers all libraries in Nigeria is not put in place. And this makes many libraries doing what they likes. No unanimous platform for discharge of activities which is an hindrance to library networking and general issues of ICT utilisation. Learn more of this in preceding chapters specifically chapter.

5.2.2 Prospects of automation in Nigeria librarieslibraries

Certainly, there is less reliance on conventional library techniques of information collecting, storage, processing, retrieval, and dissemination due to the emergency of automation in Nigerian libraries. In Nigeria, the majority of libraries struggle to remain relevant in the digital age. Academic libraries in particular are releasing digital services and goods that are designed for the institutional community and make it simpler to access essential information. Many academic libraries in Nigeria have advanced in terms of time and place convenience, allowing users from various locations to do searches directly inside the library's text rather than physically examining catalogue cards to find library contents. Thorough solution to the challenges previously itemised is what would guarantee continuation and improvement in service provision in these libraries in the furture. With timeline solutions to various challenges of network connectivities, automated libraries may disseminate and share information both locally and globally.

There are several advantages to library automation in Nigerian libraries. The largest advantage is instant access to library materials, and users may always choose from a wide range of formats, such as PDF, Word, and HTML. Reading using automated library resources won't ever make readers sneeze or leave ink stains on their hands since they are clean and devoid of the dust and mildew that are occasionally connected with books on the shelves of traditional Nigerian libraries. These conditions exist in Nigerian

libraries as a consequence of attempts to automate, and given the current circumstances, additional advances are anticipated.

There is no doubting that Nigeria's library industry has improved through time, moving from a manual, outmoded manner of over-the-counter information searches to a more modern, digitally driven means of information delivery. Nigerian libraries have remained averagely successful in their efforts to remain relevant in an increasingly digital environment, particularly as more and more libraries began integrating information technology into their daily operations. The majority of libraries in Nigeria, particularly academic libraries, are making efforts to increase the use of the internet and digital library systems to connect with users. Most academic libraries in Nigeria are projected to face intense competition from alternative sources of information due to the rapid advancements in digital technology and user expectations and a search for new ways to improve service delivery strategies in tune with fourth industrial revolution (4IR). These practices would make academic libraries and other libraries in Nigeria face new challenges but prospects lies on fast solution to emerging challenges. In the fast changing world and fast changing libraries, digital technologies will replace many entry-level roles in the libraries and shall change the mode of delivery for some traditonal services in Nigeria libraries.

5.3 Chapter Summary

This chapter covers:

- § Challenges of automation in Nigeria libraries
- § Strategies to overcome challenges of automation in Nigeria libraries
- § Prospects of automation in Nigeria libraries

5.4 Evaluation

1. List five major challenges of automation in Nigeria libraries
2. Identify five strategies to overcome challenges of automation in Nigeria libraries
3. Briefly discuss the prospects of automation in Nigeria libraries under five headings.

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