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Use of Emerging Technologies in the University Libraries: A Study of Review of Literature

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Abstract:

The main aim of the study is to review the literature related to the use of emerging technologies by university libraries. The primary objective of the study was to examine the core literature related to emerging technologies used in the university libraries and to find out the changing role of the university librarians in these technologically equipped modern libraries. The study also focuses on the attitude of library professionals towards this modern environment. The findings of the study are based upon four themes, they are: "status of emerging technologies in the university libraries", "attitude of librarians towards the emerging technologies", "technological compatibility among the professionals of the libraries" and "barriers in the implementation of emerging technologies". Nevertheless, if there have been many researches performed at university libraries on emerging technologies, this study is primarily aimed at improving understanding of these expanding technologies by the library and information sciences profession.

Keywords: Emerging technologies, Technology in libraries, University libraries, Modern technologies, University librarians, Library professionals.

1. Introduction:

Technology today plays a major role in every aspect of life. It has revolutionized the world by its massive impact on individuals, organizations, governments bodies, etc. Libraries, similarly, have transfigured themselves from time to time in providing the best possible service/products to their users. Academic libraries mostly show an immense impact of technological advancements. Web-based services, implementation of new technologies have greatly pampered the users. Technology often is constantly linked to getting concrete outcomes, eliminating some challenges, doing some operations using amazing skills (Lan and Young, 1996). Nevertheless, it becomes the duty of academic librarians to identify and understand these technologies to match their libraries with the expectation of their users, thereby developing required technological skills.

While technology trends are rising exponentially, it is obvious that librarians may not be able to incorporate every single trend in their libraries. Therefore, they must choose the technology in such a way that will help them in a long run keeping in mind the information priorities of their users. However, the academic library should be the primary centre where

these technologies should be experienced practically or in the form of a document, to remain at the forefront of technology in a higher learning institution. The aim of this study is to investigate several developing library technologies that are beneficial and advantageous to university libraries.

2. Review of Literature:

Lubanga and Mumba (2021) the field of research and development, creativity and innovation of the library are major points in a technologically driven world and are vital aspects of restructuring library services and products for efficient service delivery and optimum client experience. This study examined the importance of research and development, creativity, and innovation at the University of Livingstonia (UNILIA) library in the 21st century.

Saibakumo (2021) the long-term survival and support of academic libraries in the technological society depends on the expansion and upgrading of information services. In academic libraries, technological developments have pushed libraries to take all-embracing, user-friendly, and technology-driven methods to delivery. This apparent gap appears to be filled by new technology. The study highlights the degree to which new technologies are understood, adopted, favoured and ready to be included in academic library operations in Nigeria.

Chingath (2020) expressed the main objectives of his study, which is to demonstrate the integration and seamless functioning of technology in libraries. Whereas, the author also covered major technology developments such as Robotics, Drones, Blockchain, Big Data and Mobile Apps as well as their use and application in libraries. However, the fields and services of the library for which the technology may apply were also selected and discussed based on a cumulative examination of the available literature and further research by the author.

Funmilayo and Ayo (2020) attempt to determine the worldwide trends as well as a new library and IT technologies, so that readers may focus on them in particular for efficient library services. Moreover, the emerging technologies in library and IT services have led to the occurrence of several changes, as well as social expectations of librarians and information professionals.

Moruf and Dangani (2020) As information technology is becoming increasingly pertinent to academic institutions, librarians and other IT professionals need to master the technology which can be used in academic institutions, as developing digital expertise are fundamental in all academic curriculums. Their study not only discusses the rising trend in library technology particularly in academic libraries but also examines the need to reflect and refocus on how technological developments are influencing their services further.

Acharya, Hiremath and Lalasangi (2019) highlight the percentage of progress in the cutting-edge library. Then there are many modifications to the library and data benefits, as well as to the tasks and wishes of the library specialists to meet the customer data request in this period, according to the current advanced situation. Due to the ICT Impact, Digitization and library modernisation, another viewpoint has emerged in the field of LIS. It is recognised that computerised innovation in every sector and circle of life has created room for itself.

Ajie (2019) in his research paper discussed how Nigerian information professionals are progressing in this period of globalisation, as well as the types of opportunities and challenges faced by them. Libraries have both opportunities and threats in today's rapidly changing information society. Many changes have occurred in the way data is identified, acquired, processed, and communicated to library patrons as a result of information

technology. New paradigm transformations are emerging in libraries and information centres. The transition of information sources and systems from paper to electronic medium is one of these transformations. Information requirements of a demanding patron are complex. The cost and quality of information have both increased. Because library patrons come from all areas of life, they demand equally various forms of information.

Chukwueke and Onuoha (2019) concluded that because of the many advantages it has to provide, ICT applications in libraries are of great relevance. The benefits include improved library services efficacy and efficiency, reduced access to information time, location and recovery time, conserving physical space for the library and so forth. In addition, several academic libraries are still not yet completely using these ICTs in their services despite their many benefits.

Llewellyn (2019) identifies innovative features of digital education, collaboration and co-creation in academic libraries, student experience and the design of learning spaces suitable for modern pedagogy have been found by the literature research. However, the author also examines the changing character of the academic library and the function of academic library professionals in the context of a broader transformation in society and higher education.

Shashikumara and et. al. (2019) the authors make an effort to understand the developing trends in technologies to benefit the libraries and library professionals. Future changes in the technology of libraries have full influence on the country in terms of economic, educational, social, environmental, political and population intelligence. Their study examines the main technological developments highlighted by ALA. Current technology is helping libraries and library professionals improve their quality of services and products. Knowledge of these techniques is more necessary for library professionals in order to introduce and accept the most recent trends in libraries. In the recent decade, since the latest technologies have been introduced into library systems the advancement in technology has provided numerous library solutions. Library 1.0; Library 2.0; Library 3.0 has transformed libraries dramatically from traditional library services to new ones. The developments in technology in Library 4.0 provide a blueprint for future libraries and their user services.

Abubakar and Attahir (2018) emphasised library creativity and innovations, the competencies which creative and innovative librarians require in academic libraries to offer services, and the unique and new services rendered in academic libraries. Further, they also discussed the major hurdles in designing and providing new services in the academic library thereby providing answers to them. However, they also tried to explain the abilities required to be attained by the 21st-century librarians to provide the best possible services in library and information science particularly, in academic libraries.

Boruah (2018) mentioned in his research paper that the main purpose of the research was to examine the numerous challenges with higher education in northeast India, as well as to investigate the region's future educational possibilities. The research report also makes recommendations for improving the quality of higher education in north-eastern India. Higher educational institutions in India, particularly in the northeast, have encountered numerous challenges. Furthermore, each year, a large number of students from North East India attend universities and colleges in Delhi, Calcutta, and Bangalore, among other cities, to pursue education in a variety of professions.

Enweani (2018) explained in his study the various possible difficulties occurring in maintaining university libraries in today's digital age. The article employs a mix of desk research and interview sessions in its analysis. And detailed literature research and content analysis were used to draw conclusions. The changing library environment, the necessity for good university library management in the digital era, and the main themes in the article were all highlighted. The study concludes that university libraries face a lot of management

issues and that there is a pressing need for university library administration to adopt practical and inventive initiatives to solve these issues. Only then, can university library management in the digital world produce the intended results? For this study, the researcher used a survey method with a questionnaire as the primary data collection tool. However, the researcher also conducted an interview of the respondents in order to match the data collected through a questionnaire.

Hussain and Jan (2018) performed a survey research method through a google form on the awareness of web 2.0 tools. In their study, the primary focus of their research was to find out how much Web 2.0 technology is used in university libraries in Islamabad, Pakistan. According to the findings, young library professionals are more interested in web 2.0 technology activities. Social networking sites are more effective for marketing library services in Web 2.0 applications, therefore these technologies can be leveraged to give end-users the most recent and up-to-date information. Because this study only looked at the Islamabad region of Pakistan, further research might be done in the future to learn more about similar applications in Pakistani libraries. The study also justifies the use of web 2.0 technology in Islamabad's academic libraries, hence, it might be used as a guide for researchers in Pakistan in the future, and it could be proven when conducting research on Web 2.0 in its right context. The paper presents accurate and valid data on the same problem, which will be useful and defensible in the future by highlighting the same issue.

Barathi, Loganathan and Rajan (2017) explained in their paper how technology advancements have enhanced information management and library services. By offering an overview of the difficulties connected to integrating and using emerging technologies and innovative practices inside libraries, this paper fills a gap in the digital library project management literature. Technology that is still developing helps to identify, evaluate, and implement the use of existing and new technology in the management and services of libraries. Challenges arising from library services and management, as well as technological improvements, must be updated on a regular basis to keep up with the fast-paced world.

Brown and et. al. (2017) revealed in their study about the major goals which were to explain the implementation of a skills development initiative in Columbia University's Science & Engineering Libraries to increase the technology capabilities of participating librarians in response to changing instructional needs. The researchers also suggested that this integrated project strategy might presumably fit a wide range of library environments, giving other institutions a great opportunity to evaluate and redesign staff capabilities, regardless of their instructional focus. The Maker Movement's programmatic lens is used to a collaborative staff learning model in this case study. Burgeoning technological advancements force libraries to investigate unique techniques to expose staff to new technology capabilities; this case study applies the Maker Movement's programmatic view to a collaborative staff learning model.

Cross and Tucci (2017) discussed the development and implementation of the collection with the help of new technologies at The Carleton University Library. Due to the successful outcome of the pioneering initiatives of the library, the collection currently contains more than seventy pieces of electrical devices available on behalf of students so that they can borrow in order to assist their experiential learning. Community involvements, teacher participation, Outreach and Innovative projects for students have all benefited from the Emerging Technology Collection. A notable use of collection on the latest technology, continuous library staff education, and marketing of the collection of the library have all been positive outcomes for the Library. This successful initiative demonstrates the advantages of a shared space where various campus divisions may collaborate to design and provide a new service. Finally, this initiative highlights the importance of academic

libraries which are amenable to new advances thereby providing helpful facilities by demonstrating the worth of innovation. It might be difficult to integrate technology into the organisational culture of academic libraries, but it is achievable if the library administration strongly promotes innovative thoughts and services.

Mwaniki (2017) study intended to conceive the future of academic libraries in terms of emerging user requirements, new skills for staff and services provided. The literature of the study demonstrates the development of new technologies and their effects on professionals, library services and new user requirements. The debates on what library products and services will be in future libraries are gathered together in this article. He also examines upcoming research that investigates ways to enhance librarians' professional function. This is a conceptual literature study based on a broad variety of literature theoretically examining professional positions, the library collection, its services and the evolution of new technologies on the need of the user. The library will now provide the basis for the future function of the librarian, increasing user requirements and the effect of the provision of services. The development of the library systems and services supplied also influenced technological developments. In future, how advanced libraries are in the area or country, including Kenya, will rely largely on their developing function. This article provides the skills and services of future librarians with a flexible approach.

Patel and Darbar (2017) stated in their research the utilisation of ICT resources and services in the selected government grant-in-aid university libraries in Gujarat State. Over the previous 50 years, the world has experienced major developments; especially ICTs have caused a revolution in many areas. Their study also focuses on the availability of various ICT based services and facilities along with the problems faced while implementation of technological infrastructure. However, the study concluded that a significant number of the government grant-in-aid university libraries were efficiently using information and communication technology.

Ratledge and Sproles (2017) implementation and proliferation of library technology have changed system librarians' roles and responsibilities. 70 advertisements were reviewed by the authors for technology-driven librarians on the Job List of ALA in 2014. The announcements were investigated for emphasis areas and necessary expertise and experience. Three key areas of concentration were disclosed in the ads: conventional systems, digital efforts and online services. The technology librarians have expanded and incorporated more inside the library, rather than only focused on keeping library databases and ILSs alive. This study also provides insights into the increasing importance of technology librarians in today's library in the field of library and LIS programmes. However, the main focus of the study is to analyse the evolving role of the system librarian in modern, technology-rich libraries in technology-related advertising.

Santosh (2017) study offers helpful insights into how librarians in Indian libraries use Web2.0 tools. This research intends to examine the application in the Indian academic libraries of tools and technologies of Web 2.0. Data were obtained from 46 central university libraries in India by means of a standardised questionnaire. The results show a reasonable degree of consciousness and familiarity among library professionals with Web 2.0 tools and technology.

Verma and Brahma (2017) after an analysis of the websites of 10 Central North East India Universities, it has been shown, among the Central India University websites, that the Mizoram University's Web Impact Factor is 52.73 IWIF, 30.80 EWIF, and 83.54 SWIF.

Beninghove (2016) performed a study and expressed in his paper that his work was a qualitative, exploratory research study in which three case studies from three institutions in the Western and Midwestern United States were examined using Peter Senge's systems thinking conceptual framework. Interviews with ten participants were performed in order

to gain a better understanding of the drivers of innovation in academic libraries, as well as how the organisational structure of libraries contributes to the development of ideas. Constant comparative analysis techniques were used in order to code and understand the data. According to the researcher, the process of innovation plays a critical role in the deliberate design of library services, resources, and staffing.

Makori and Mauti (2016) This research was carried out in five higher education and learning institutions, with three public and two private university libraries participating. Although public universities in Kenya are well-funded and supported, the Commission for University Education is working to merge the two sectors into one. Kenyan public universities were ranked among the best in the world in a recent web ranking of higher education institutions (Webometrics Ranking, 2015). Furthermore, university libraries have created successful digital repositories that increase the visibility and attention of academic and research outputs around the world. Libraries offer information and expertise to benefit academic institutions achieve their aims and objectives.

Manoj and Sinha (2016) study present a potential methodology for designing and constructing the Sikkim Library Network (SILIBNET), which would meet the needs of Sikkim's academic community while also speeding up the process of creating the state's library network. The first section of the paper gives a brief overview of library networks for resource sharing, including their goals and purposes, as well as the many causes that led to the formation of local, regional, and national library networks in India. The proposed model of Sikkim Library Network (SILIBNET) with many facets for resource sharing in Sikkim in a true sense for the general development of the society is described in the second half of the study. In the age of open access, open-source, and open libraries, the necessity for such a large regional network is critical. It is up to Sikkim's LIS specialists to step up and debate the issues from many perspectives in order to develop such a network in this distant portion of the country.

Joshi (2015) reported a survey of twelve university libraries in Chandigarh, Himachal Pradesh, Haryana, Punjab and Jammu and Kashmir with a focus on applications of ICT. Eight out of twelve libraries have distinct names, according to the responses filled in the questionnaire as well as information obtained from the websites of the universities. Despite a widespread administrative indifference about the worrying status of empty posts, the article finds that university libraries have obtained digital resources and Information and Communication Technology-based infrastructures which ultimately helps them in rendering ICT based services.

Konwar (2015) explored the different concerns and challenges associated with ICT deployment and digitization in Barak Valley, Southern Assam college libraries. In comparison to the rest of India, the Barak valley in Assam's interior and northeast India has experienced less economic development. Faced with a variety of issues, the region's college libraries are expanding day by day in order to meet the demands. With their software SOUL and other assistance, UGC's autonomous centre INFLIBNET continues to make every effort to encourage the automation of libraries in this region. The paper also highlights the challenges that academic libraries face when it comes to ICT adoption and digitization.

Sinha and Gautam (2015) in the operation of libraries and information centres, ICT caused revolutionary changes. Everyday life is marked by the effect of ICT, particularly the WWW and the Internet. Academic libraries are facing problems with the increasing price of learning resources available. Therefore, consortium methods for acquisition and access to electronic resources by colleges and universities are being embraced and explored.

Verma and Devi (2015) a checklist was drawn up and online pages from the library web pages were rated on the basis of prior evaluations of different authors' websites. The

research was conducted to analyse the availability of information on the Indian Central Universities' library website. The analysis was further based on information on the library website of the selected universities.

Verma (2015) due to the effect of ICT and the digitalisation of library resources, new paradigms have changed for the past two decades in the field of library and information science and changed the earlier sense completely from preservation of documents to management of knowledge. Based on the never-ending explosion of information in different ways, caused due to globalisation, privatisation and liberalisation in all aspects of human life, is the main cause of the emergence of the production, communication and access to information technology and its application giving rise to the various types of challenges faced by professionals. In order to address these challenges, the attitude and methods of the modern librarianship need to be changed from document guardian to information supplier. The way libraries employ the conventional shop house for providers to access has been a paradigm shift. Furthermore, the contemporary digital environment has brought a lot of changes to the duties and expectations of the librarian professionals not only in terms of library and information services but also to meet the information requirement of their users.

Yuvaraj (2015) a list of 20 characteristics that impacted the adaptation of an organisation to innovation was developed after the examination of relevant literature on the issue. Respondents of the study were requested to identify the relevant degree of each cloud computing validation criterion. Furthermore, the analysis concluded that the Banaras Hindu University library system (BHULS) favours the use of cloud computing technology. Whereas, personnel's of the library also were very keen to use cloud computing and were ready to face the obstacles. Cloud computing benefits are insufficient to persuade companies to move from the classical computer paradigm to the cloud. The cloud may not become a widespread technology through technological progress. However, in order to enhance the use of cloud computing services, collaboration among cloud service providers complemented by strong Cloud laws will have to be developed. The study therefore also provides the reaction of library professionals towards the adoption of cloud computing.

Golz (2014) performed a mixed-methods study which looked at how California community colleges employ library/Web 2.0 technologies like social media, chat reference, and text messaging by combining quantitative and qualitative data from library websites, library social media posts, and a survey of library officials in California community college libraries. More than half of California community college libraries use Facebook and LibGuides as their primary library/Web 2.0 technologies. LibGuides was evaluated as effective or highly effective by the majority of California community college librarians, while Facebook was assessed as just slightly effective. The study also reveals that the majority of librarians believed that social media might be a useful platform for promoting library activities and events to students, as well as an effective outreach tool. Whereas, lack of staff time, limited funds, a lack of staff training, and institutional policies were all mentioned as hurdles to implementing new technologies. Growth of library social media subscribers and analysis of the types of content that elicited the most student response was used to gauge student response to library social media.

Hayman and Smith (2014) mentioned in their article the current developments in EBP (evidence-based practise) and upcoming educational technologies, as well as a paradigm for enabling evidence-based decision-making. The paper presents an overview and synthesis of significant problems that are important to librarians working in a complex and ever-changing landscape of learning and teaching technologies. Academic librarians contemplating developing educational technologies in their pedagogy, as well as those who assist the pedagogy of others, will benefit from the proposed strategy, which strives to

develop a sustainable model for solving evidentiary concerns. Overall, the goal of this paper is to examine methods for making long-term decisions about how to integrate developing educational technology into library instruction while maintaining evidence-based practice (EBP).

Jan and Sheikh (2014) It is a well-known fact that digital technology has found a place in almost every field and area of existence. In this way, libraries are much the same. In this current era, all libraries retain information in the form of audio, video, and other multimedia sources in addition to books. Their paper focuses on the effects of developing technology on Pakistani university libraries. A total of 91 university libraries in the public sector were chosen for this purpose out of which a sufficient number of libraries have responded. The study's findings show that implementing emerging library technology has a favourable influence on library services and resources at Pakistan's public sector universities. Insufficient budget for library automation, a scarcity of qualified library personnel's, a lack of user education programmes on developing library technology, and repeated power outages have all been identified as key challenges to the adoption of new technologies in university libraries across the country. These barriers can be overcome by giving the country's libraries the attention and resources they deserve.

Kumbhar (2014) The Horizon Report 2014 by the New Media Consortium (NMC) makes some projections regarding new technologies and trends in higher education around the world. The study discusses the position of academic libraries in light of the Report's forecasts. The study mentions a few of the higher education trends highlighted in the report, as well as reviewing and discussing academic libraries' current and potential actions. According to the article, academic libraries are contributing to growing trends in higher education through novel approaches and services. It concludes that, despite their efforts, academic libraries still have room to improve their function and demonstrate their worth in the changing higher education environment.

Sinha and Chanda (2014) there is an immediate requirement for the utilisation of RFID technologies in the libraries and information centres of North East India. The RFID technology is useful in the management of several universities and institutional library activities. Implementation of RFID Technology in Universities and Institutional Libraries of North East India has been discussed further in their report.

Corrall, Kennan and Afzal (2013) discussed in their study which found out that librarians require a multifaceted awareness of the research environment. Academic libraries are being challenged by changes in network technology, scholarly communication, and national policy to develop new methods to interact with research communities during the economic slump. In fields like bibliometrics and research data management, librarians are reacting with service innovations.

Phuritsabam, Devi and Sagolsem (2013) discussed the developments, difficulties and problems faced by library professionals and also provided suggestions in order to face future technological challenges.

Sinha and Bhattacharjee (2013) depicted the current ICT awareness, internet literacy scope and Internet usage patterns among users of Barak Valley College Library in South Assam. The report includes the users mainly from the library where the impact of computers and the internet is very less.

Sinha (2013) in the context of the North-Eastern India Library Network, several possible problems and obstacles have been recognised and explored. Several ideas and proposals have also been offered to make this endeavour an achievement.

Turner, Welch and Reynolds (2013) examined the professional discourse on information and study spaces in university libraries, notably in the first decade of the 21st century. It explores the history of academic libraries and the creation of learning spaces that focus on

the usage of the terminology derived from the notion of information communities. The literary review of their study is largely determined by a notion of how alternative models for the use of space in academic libraries for the provision of information and training services may be visualised, till "maker spaces," have recently occurred. The language of each model is taken into consideration, and historical changes, objectives, educational effects and qualities for a better understanding of changes and trends are noticeable.

Yuvaraj (2013) explains clearly how cloud computing tools are used in library services and how librarians at Indian Central Universities function. The study further concludes that librarians depend extensively on cloud computing technologies and use different devices to provide better library services. However, the key drivers of this phenomenon are economies, delivery models and service tiers as well as user demand for cloud computing. Most librarians, though, indicated their worry about safety.

Jerry and Ramasesh (2012) Technology is the ultimate cause of growth. It provides a pathway for overcoming major obstacles. Information and communication technologies, as well as their applications, have always been beneficial in expanding information services. In a higher education system, they have influenced teaching, learning, research, and extension approaches. The impact of integrated ICTs and Web technology tools on libraries is highlighted in this study, which can help libraries modify their profiles for better and improved information services.

Kattimani and Naik (2012) The goal of this study is to compare the ICT and librarianship capabilities of different library personnel's (librarians, deputy librarians, assistant librarians, and library assistants, among others) who work at different libraries in Karnataka, India. The research employs a mixed methodology comprising fieldwork, theory, data collection instruments such as questionnaires, observations, and interactions with librarians and information professionals. The bulk of library professionals employed in Karnataka's engineering colleges fell into this field by chance. Different designations show major differences in computer operation, file and folder creation, library automation software modules, radio frequency identification, internet-related capabilities, multiple operating systems, web design/ editors, IR digitization and search engines. Librarians have exceptional web design capabilities when compared to all other professions. The maximum number of professionals are dealing with financial difficulties, work overload, and a hostile attitude from higher authorities against obtaining ICT skills. This is the first research of ICT and librarianship abilities among library professionals working at technical colleges in Karnataka, India.

Mutula (2012) shares the experiences and lessons learnt from the automation of the library at the University of Botswana (UB). The paper presents the case study of the University of Botswana on library automation. A number of elements have been linked to the successful execution of the Library Automation project, including achieving strategic management, thorough engagement of major stakeholders, aligning library automation along with the university's vision, strengthening library workers' capabilities and ensuring that their employees are secure for librarians. The automation project has involved increased access to a variety of digital resources, improved librarian images, new services, the release of the physical spaces of the bookstore, the transformation of the bookstore into a social environment of learning, the possibility of accessing local content through scanning, new acquisitions of skills and access to the remote electronic resource library. The challenges addressed included employee concerns about employment prospects, acquiring new skills, increased bibliography obligations, increased user expectation, expensive membership fees for whole text journals, bandwidth problems, etc. The results of automation expanded data services, a retrained librarians' image, improved satisfaction of the users, and a university transformation into learning- and research centre. This led to improved information

services. The study concentrates on experience and impacts in services and people and physical resources of automation at the library of the University. However, the research covers technological and management strategies for managing change at the University of Botswana setting of library automation.

Susan and Baby (2012) research indicated that most professionals are not directly connected with services based on ICT. Most Universities have noted that the ICT-based services are supplied by a few well-educated professional librarians or computer professionals and most professional librarians don't know about ICT services, or mainly don't know the facilities at their institution. Data on the ICT literacy of professionals in libraries were analysed. The study concluded about the library professionals' abilities and understanding of various technologies, ICT applications and services. It also helped in assessing the position of library professionals in relation to ICT applications.

Vijayakumar and Thomas (2012) libraries play a major role in fostering knowledge growth. With the commencement of the modern era, people now have started facing many problems to stay up with the contemporary information technology developments that have caused the explosion of information and the information revolution.

Issa and et. al. (2011) conducted a survey research method. It had a population of 929 people at the time of data collection, which included all active users of the Federal University of Technology, Akure (FUTA) Library, registered undergraduates and postgraduates. The Federal University of Technology Akure Library's application of IT to service delivery still has room for development, limiting its influence. This condition has a number of issues, including limited funding, poor facilities, and regular power outages, all of which obstruct the realisation of its intended benefits. At the National Open University of Nigeria (NOUN), Ibadan Study Centre, Aramide and Bolarinwa (2010) confirmed the existence of these issues, finding that "the key obstacles inhibiting the use of audio-visual and electronic resources are poor power supply, inadequate infrastructure, lack of necessary competence, high cost, and unavailability."

Jan and Sheikh (2011) revealed in their study, the major purpose to conduct the study was to compare the current state of automation in Islamabad, Khyber Pukhtoonkhwa, Pakistan's public sector university libraries. However, the major objectives of the study, on the other hand, were- to evaluate the services and resources available in the university libraries in Islamabad, Khyber Pukhtoonkhwa using comparative analysis, to determine how happy users are with technology-based services and resources in the aforementioned university libraries, to make recommendations on methods to strengthen the public sector university libraries in the study area.

Kamba (2011) In the late twentieth century, the Information Age changed industrialised countries, and it is now set to have an equally significant impact on developing countries. Higher education libraries have benefited from the use of information and communication technology (ICT) to improve the availability of library and information resources and services. African libraries are also embracing ICT in order to improve and contribute to the growth of research and information use. The availability and high quality of services, enough resources, and communication infrastructure are the main success factors for this development. The study examines the efforts undertaken by African higher education libraries to recognise, reform, and re-orient library infrastructure and employees in response to ICT adoption. Furthermore, the study discusses numerous efforts to build library networking and consortia, as well as the consequences that could be obtained from incorporating ICTs into higher education libraries. The study also discusses why ICT application is moving at a steady pace in Nigerian library development and offers alternatives as a remedy for library growth in Africa.

Pant (2011) presented in his study the difficulties which North-East India's technical institutes face. He has also discussed the solutions which will help to strengthen their role as a significant participants in the new global economic order in India.

Shafique and Riedling (2011) study based on the literature review and personal interviews was performed focusing on the status of research in Pakistan on the aspects of Web 2.0, library development using Web 2.0, its applications, and to highlight the response of library professionals towards Web 2.0. However, considering the review of literature results, past surveys and current surveys, a suggestion was presented in an era of developing technology for the survival of libraries in Pakistan. The application of Library 2.0, a second life for Library services, was discovered by libraries in Pakistan. The study, therefore, offers a proposal on the use of library 2.0 apps for library services by information professionals. The article is the first to address the growing notion of a 3-D library in Pakistan, provides a solid knowledge and application of, many ideas such as Library 1.0, 2.0 and the 3D Library.

Somvir and Kaushik (2011) based upon the growth of websites and other information technologies, library and information professionals now have enormous potential. In addition to barcode technology, RFID facilitates and accelerates circulation, material security, inspection and storage checks. However, the authors have also discussed an overview regarding the RFID fundamental structure, function, important standards along with their merits and demerits. The newest technology for ensuring robust security and automatic identity surveillance systems in libraries is radio frequency identification technology.

Sinha (2011) surveyed comprehending the perspective of the users in terms of reviews of their daily work in academia and research.

Cervone (2010) explained in his study which aimed to explore the difficulties surrounding developing technology and innovation in libraries, as well as their influence. The article provides a broad review of emerging technology and innovation, as well as their application to library practices. Librarians must be vigilant when using vocabulary such as emerging technology, because what is new in one area may not be new in another, and librarians must understand how those variances may play out within their broader organisations in order to maintain credibility. Libraries must indeed be open to new experiences and explore different things with their services and processes. However, because technology evolves at a rapid pace, libraries must be flexible in their evaluation and implementation of new technologies. The author also points out in his paper the challenges surrounding the implementation and use of technological advancement and creative library practices.

Panigrahi (2010) The library and information centres have a key role to play in the information society because of the proliferation of information. This can only be successfully and efficiently handled by well-trained workers. To satisfy the requirement to grow the workforce, libraries need a systematic education. This article addresses the LIS education system of eight North-eastern India, Orissa, and West Bengal states in Eastern and North-Eastern India. Identifies that LIS education began and expanded throughout other neighbouring states in this region in western Bengal. The research found that undergraduate courses were begun at numerous colleges, but most were abandoned for a large number of reasons. Current courses, such as the DL, PGDLAN, MPhil, PhD, DLit, MLIS, etc. are conducted at different levels in DL. DLIS is also now available. The need for these courses to be standardised is crucial. Data concerning entrance requirements, course content, delivery of course material: methods of instruction have been obtained by means of questionnaires, interviews and websites. The statistics indicate the current state of LIS education in the region.

3. Findings:

Based on the review of literature four themes emerged: "status of emerging technologies adopted by the university libraries", "attitude of librarians towards the emerging technologies", "technological compatibility among the professionals of the libraries" and "barriers in the implementation of emerging technologies".

3.1 Status of emerging technologies in the libraries:

Sixteen papers reported on the status of emerging technologies in the university libraries both at national and international levels. Lubanga & Mumba (2021) the prominent factor for the existence of new services and products at UNILIA libraries is ICT i.e.; library 2.0, platforms on social media, emails, internet and electronic and public catalogues. Furthermore, UNILIA libraries have been shown to be able to adapt to the quickly changing environment and improve existing services and products while also taking advantage of the new possibilities and trends in library and information science via research and creativity and innovation in technology. Saibakumo (2021) nevertheless, in the midst of 18 new technologies, adoption is stumbling whereas, very few have readiness and awareness of the cybrary, library website, WebOPAC, institutional repository and social media. The utility and character of learning environments have been inclusively used in technologies like the Integrated Library Management System, the Library Guide app, RFID and the internet of things. Chingath (2020) revealed that all of the technologies in libraries have viability, such as the development of an encrypted database, speaking robots and flying books, etc. The introduction of these technologies will contribute to a larger improvement in library services. Moruf and Dangani (2020) the development of digital content in the academic libraries will have a major influence, with the involvement of emerging library technologies such as instructional system design software, electrical copyright management systems and bibliographic citation software, integrated search software, library automation software, electronic resource management and classroom management software. Acharya, Hiremath and Lalasangi (2019) talked about the innovative technologies in their paper such as the bleeding Edge: Facial recognition is coming of age, Updating media labs and maker spaces, Robots, Library portable applications, Virtual reality applications, 3D printers, Kinetic bicycles in the library, Digital narrating, Book conveyance ramble, Digital interface for printed books, E-reader applications, Cloud printing, replicating and examining. Ajie (2019) analysed the concept and practice of globalization in university libraries which will be connected to Nigerian Libraries. Llewellyn (2019) reveals in his study that digital revolutions have significantly affected the nature of learning and have given academic libraries new chances to adapt their approach to study, teaching and research in academia. Moreover, Shashikumara and et. al. (2019) have picked the following modes of technological development: connected toys, data everywhere, drones, blockchain, haptic technology, facial recognition, virtual reality, voice control, robots, plugged-in. And how technology may transform the face of libraries, and how can new technology continue to evolve from time to time. In order to compete with the rapidly developing environment, technical developments must be regularly updated (Barathi, Loganathan and Rajan, 2017). A conventional library has transformed its automated, electronic, virtual and digital library with rapid expansion and usage of modern technology. In particular, the library scenario in an academic set-up has transformed entirely this revolution (Jan and Sheikh, 2011). Emerging library technology implementations have a favourable influence on the University's library and resources services (Jan and Sheikh, 2014), numerous instances of the solutions used by university libraries to improve services and innovation utilising new

technology (Kumbhar, 2014). Modern education demands academic institutions to have enough information infrastructure to provide access through digital technologies, the digital warehouses, the Internet of things, mobile computer systems and social media platforms to education, learning, information, and knowledge resources (YouTube, Twitter and Facebook). E-learning, e-resources, e-information and electronic archives must be furnished in a digital environment that must be expanded using contemporary technical resources and facilities such as social cloud computing and the internet (Makori and Mauti, 2016). The library has led to improvements in quality information services, increased librarian image, librarians' skills, university transformation and user-friendly satisfaction into a learning and research centre (Mutula, 2012). Sinha (2013) however, focused on several open-source software that may be utilised for library network development. There are various social networking sites that are suitable to link LIS experts and provide member libraries with information via, Facebook, wiki, blogs, RSS Feed, LinkedIn, stream media, etc. Finally, Sinha and Chanda (2014) with respect to national and international scenarios, outlined the use of RFID Technology which has become extremely important in libraries and other commercial organisations and the possibilities of deploying RFID technology in libraries and information centres in Northeast India urgently needs further study. It is not surprising that libraries today are striving in this modern era in order to establish their worth as well as serve the users undoubtedly.

3.2 Attitude of librarians towards the emerging technologies:

Twelve papers revealed the attitude of librarians towards emerging technologies. Saibakumo (2021) there was a strong level of awareness among Nigerian librarians towards many developing technologies (such as RFID, institutional repositories, Cybrary, library websites, social media, Internet of Things, use of Library Guide application, Integrated library management system and WebOPAC for effective service delivery) and their relevance to university libraries. Funmilayo and Ayo (2020) librarians, however, are required to upgrade themselves along with the system in order to furnish user-oriented services through adherence to the latest online technologies utilised worldwide to furnish library services because any librarian who is unaware of trending problems and adoption of the newest technology will be redundant and left behind. Ajie (2019) expressed the changing responsibilities of librarians in this evolving information technology environment. Abubakar and Attahir (2018) explained certain skills that must be build up in the librarians from time to time in order to be in sync with the fast-growing world. These skills include leadership, interpersonal relationship, technological awareness and understanding skills, problem-solving, systems thinking and understanding, knowledge of intervention skills, etc. Barathi, Loganathan and Rajan (2017) described the aim as to share resources with existing information leveraging modern technologies, enhancing community growth, improving services for library members and providing a wide variety of time-saving features. Cervone (2010) concluded that as technology evolves rapidly, librarians must be nimble for technology assessment and deployment for displaying better services. Most of the researchers believed that social media might provide an effective platform for student promotion of library programmes and activities and that social media may be a useful instrument for communication (Golz, 2014). Kamba (2011) emphasises the varied networking and consortium initiatives within libraries and the possible consequences that ICTs might have for the libraries of higher education. Mwaniki (2017) librarians must always increase their professional abilities to reflect technological progress. The professional abilities of librarians and their educational growth must alter radically. Susan and Baby (2012) in order to complement and strengthen navigational abilities, the

academic librarian for this decade has to possess a portfolio of technological talents. The technology librarians have been branching off and becoming more connected with the library rather than just managing library databases and ILSs (Ratledge and Sproles, 2017). Yuvaraj (2013) discussed the efforts made by librarians to significantly focus on cloud computing technologies and most of them use numerous gadgets for better library services. It is clear from the review that librarians are trying their best possible ways to acquire knowledge related to trends growing in this rapidly evolving world. The reviews performed have also focused on the attitude of librarians towards the growing technologies in order to meet their users need.

3.3 Technological compatibility among the professionals of the libraries:

A significant number of papers (Fourteen) outlined the technological compatibility among the professionals of the university libraries. Chingath (2020) illustrates a roadmap for LIS professionals, in particular among the younger generation, to integrate library technology and enhance library image. Ajie (2019) focused on the opportunities and dangers Nigerian information professionals face in this era of globalisation. Furthermore, the article also addresses the constraints of the libraries. The literature states that earlier training methods for the library's professionals were mostly designed for freshly enrolled graduates who were prepared for employee participation. The development of new technology requires libraries to develop new ways of exposing professionals to new technological abilities; which is based on a collaborative employee learning model with the Maker Movement's (Brown and et. al., 2017). Adequate/qualified staff recruiting and library staff training/retraining (Enweani, 2018). A summary of the major concerns pertinent to library professionals working in a complex and constantly changing ecosystem of accessible learning and learning technology (Hayman and Smith, 2014). Hussain and Jan (2018) suggest that young professional librarians have a greater interest in Web 2.0 technological activities. LIS professionals must have an understanding of ICT and web technologies and their tools as well as their communication skills (Jerry and Ramasesh, 2012). The difference between the different designations for computer operation competence, identification of radio frequencies, creation of files and folders, operating systems, IR digitalisation, software for the automation of libraries and internet-related competencies, Internet editors, web design and search engines is significant (Kattimani and Naik, 2012). Makori and Mauti (2016) demonstrated that pedagogy, teaching, learning and digital literacy abilities, computer science and quantitative analysis, electronic resources planning and business entrepreneurship are key to the academic and non-academic community of information professionals, academics and professors. The concerns of professionals were around job losses, learning new skills, increasing user demands, additional libraries duties, expensive subscription fees for full-text papers and bandwidth problems among others were all countered (Mutula, 2012). The library professionals have a decent degree of competence but lack a proper grasp on the tools and technology of Web 2.0 (Santosh, 2017). Shafique and Riedling (2011) addressed the growing notion of the 3-D library in Pakistan. It also offers information professionals a suggestion for the use of library 2.0 and library 3-D applications. Technological abilities enable library professionals to more broadly control the knowledge and transmit these skills as suitable to the users (Susan and Baby, 2012). Because of the unprecedented explosion of information and the availability of it in various forms, which are created in one way by privatisation, liberalisation and globalisation of every aspect of human life and the emergence, in a different way, of the information technology industry and its application in information generation, communication and access. There have been many modifications not only to libraries and information services

but also to library professionals' responsibilities and anticipations to respond to the demands of their users for information, in the current digital world (Verma, 2015). This finding clearly shows that the new era of modernisation has brought about a great challenge for the professionals working in the library environment. To bring about a change requires a great amount of mental stability as well as knowledge. Although the new technologies have made things much easier for everyone it is equally important to first build up a complete understanding of that technology in hand.

3.4 Barriers in the implementation of emerging technologies:

Twelve papers focused on the barriers to the implementation of emerging technologies in university libraries. Lubanga & Mumba (2021) violators in research and innovation policies, lack of established research and innovation centre, unpredictable technological changes in the 21st-century landscape and universities culture without supporting research and innovating are key questions that hinder library R&D, creativity and innovation in the libraries of UNILIA. Saibakumo (2021) inadequate financing, a lack of power supply, poor maintenance are the major barriers that restrict efforts made to adopt new technology. Increase in information costs and quality. Infrastructure problem, Lack of informatics/learning, The lack of government assistance might be due to fiscal restrictions, Poor upkeep and culture updating, Record conversion issue. Nigeria and other poor countries are facing a number of problems in the current information revolution, though (Ajie, 2019). Barathi, Loganathan and Rajan (2017) focused on the picture of the problems relating to the use and utilisation of new technologies and creative library practices. Cervone (2010) discusses concerns relating to implementation and the use of new library practices and emerging technologies. Appropriate finance for university libraries, effective communication and adoption of excellent management style are some of the methods for efficient library management in a digital world (Enweani, 2018). Lack of staff time, restricted resources, lack of employee training, and institutional regulations have been reported as impediments to the introduction of new technology in the libraries (Golz, 2014). The use of Web 2.0 technology in library services poses several important barriers like time consumption and concern of violation of personal information (Hussain and Jan, 2018). The main obstacles to the deployment of the latest technology in university libraries identified were poor financing for library automation, lack of qualified library personnel or user education programmes on developing library technology, and frequent power failures (Jan and Sheikh, 2014). Kamba (2011) outlines the causes for ICT applications in library development in Nigeria and also provides solutions to those problems. Fund crises and the unavailability of well-qualified staff in libraries are the fundamental issues of ICT deployment (Konwar, 2015). Moreover, Makori and Mauti (2016) highlighted the absence of skills and competence, insufficient knowledge, insufficient ICI infrastructure, insufficient information resources, sufficient social computers, poor institutional and physical structures, which have an adverse influence on the use of digital technology. New opportunities always come with challenges, this section of the review clearly depicts the areas which have become the major hurdle in the process of modernisation of university libraries.

4. Discussion:

This literature review focuses on the new or emerging technologies and services in university libraries. Emerging technology therefore can be defined as "technology that is on the cusp of adoption" (Cervone, 2010). These engagements of growing technologies

have affected the services of academic libraries tremendously. After a careful examination of the relevant literature presented above, four themes were identified. The findings of the study clearly illustrate that the studies focusing on the status of emerging technologies in the university libraries are way more than the studies performed on the attitude of librarians towards technologies, compatibility of library staffs towards growing technologies and of course lastly the barriers which hinder these technologies to get implemented in the libraries. Researchers are trying to explore the status of university libraries in this growing technological environment. WebOPAC, library websites, automation software's, digital repositories, social media, mobile apps, digital resources, e-readers, RFID, barcodes, QR codes, cloud printing, web 2.0 and 3.0 technologies, etc. have all been playing major roles in the library services in this digital environment (Makori and Mauti, 2016; Acharya, Hiremath and Lalasangi, 2019; Saibakumo, 2021). Furthermore, it is also revealed that librarians are having a positive attitude towards technologies. They are making efforts to introduce new services and products in their libraries so that they can cater to their user's information needs. Today, Ratledge and Sproles (2017) stated that technology librarians are branching off and becoming more connected with the library rather than just managing library databases and ILSs. They are experiencing changes in their role from being traditional librarians to modern information providers. The efforts made by librarians to substantially focus on technologies of cloud computing and making use of innumerable gadgets for improved library services (Yuvaraj, 2013).

Moreover, Brown and et. al., 2017 mentioned in their research that the development of staff and their training remain essential pillars for library work; the process of creating new knowledge provides an opportunity and helps in the inclusion of new staff to serve different communities. Learning practices among library staff are influenced by a number of reasons such as, the introduction of emerging technology, the constantly developing demands of library users, changing library operations and procedures and professional mandates are all possible drivers. Although, it is the fact that engagement of new technologies have changed the overall role of the libraries from traditional ones to the modern ones it has also created huge hay of challenges for the professionals working in the libraries. Konwar (2015) stated about the crises of funds and the nonavailability of well-qualified staff in libraries are the significant issues of the deployment of technology.

5. Conclusion and suggestions:

The purpose of the study is to examine literature available on the application of technology in libraries. This literature review helps library professionals and librarians about the technology used by libraries and also the barriers faced by them. Furthermore, it raises awareness of the challenges these new technologies poses both for users and for libraries. This review article examines library information services in this context of the internet environment. It offers an insight into the new technologies which are becoming the need of the hour of every individual. Users have now recognised the value of technology and hence accordingly their expectations and demands are growing. The analysis of the literature showcases that with the growing intervention of technology, challenges related to it also grows equally. Therefore, it is necessary for library resources and services to go in sync with the emerging library technologies.

The study further suggests exploring users experiences with these emerging technologies, to investigate the effectiveness of these new technologies in providing information services. Studies based on different technologies should be performed which prove to be the most useful ones for different libraries. Furthermore, studies related to

challenges faced by library professionals in pursuit of these emerging technologies can also be made.

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