

16. INFORMATION TECHNOLOGY TRENDS, CHALLENGES AND OPPORTUNITIES IN LIBRARIES

Naomy Mwaurah*; Nyambura Gathama**; Ben Namande***

**Boma International Hospitality College*
nmwaurah@gmail.com

***Kenya Medical Training College*
gathanyambura@gmail.com

****Kisii University*
wekanamande@gmail.com

Abstract

Information technology has transformed library operations, allowing for the digitisation of collections, the adoption of advanced cataloguing systems, and the provision of virtual services. Librarians must understand emerging ICT trends in library and information services such as QR code, Web 2.0 and 3.0-based Services, EM and RFID implementation. This will help librarians meet the needs of their users in this era characterised by the digital revolution and information flood. Therefore, this study aimed to examine the IT trends and the challenges and opportunities they bring to the libraries. The study was a literature review guided by the following objectives: to examine the Information Technology trends in Libraries, to identify the opportunities of IT trends in libraries, and to discuss the challenges of IT trends in Libraries. The findings of the study were that ICT developments bring inherent problems. Libraries are dealing with digital equity concerns, ensuring that marginalised people have equal access to technical resources and materials. Cybersecurity worries loom big as libraries protect sensitive patron data and intellectual property from cyber-attacks and privacy violations. Furthermore, the rapid rate of technological progress requires continuous staff training and professional growth to effectively manage the complexity of new IT infrastructures. Amidst these challenges lie abundant opportunities for innovation and growth. The study informs and empowers libraries to leverage technology effectively to provide access to information, promote literacy, and foster lifelong learning in an increasingly digital world.

Keywords: *Virtual services, library services, librarianship, digitalisation*

1 Introduction

Universally, libraries are significant social institutions; a community cannot be considered complete without one. However, the impact of ICT is causing changes in libraries, including the needs of library users, resources, services, and products. The information landscape and access tools are also changing, trying to replace reference librarians. It is common knowledge that library professionals' roles are shrinking. Still, they are growing more significant as long as they stay updated with new developments in LIS and are not afraid to go outside the box (Funmilayo, 2020).

The Library and Information Science (LIS) profession has undergone metamorphosis due to technological changes. There has been a profound change in the theory and practice of the LIS profession over the years. The concept of librarianship has been changing according to the demands of society and the bewildering growth of information and communication technology. Now, the "custodian librarian" has grown into a "knowledge manager" and a "digital librarian." Abubakar claims these changes are "global, profound, and pervasive in nature" (Abubakar, 2021). They are also significant and inevitable despite causing changes in the information landscape and altering user needs, resources, services, and library products, according to Swayam (2020). Consequently, they indicate that LIS professionals' traditional duties are changing, necessitating a deeper analysis of the opportunities and challenges of emerging ICT trends in the LIS profession.

According to Satish (2023), emerging trends and technologies in library and information services include and are not limited to Library Automation, Digitalization, Institutional Repository and Digital Library Services, Consortia based Services, QR Code, EM and RFID implementation, Open Access, Outreach programs, Reference Management, Open Science, Virtual/Digital Reference Services, Ask the Librarian, Content Management, CAS/SDI services, Profiling System, Discovery Services, Web 2.0 and 3.0 based Services, Use of Social Media, Green Library Concept, to help in Ranking/Accreditation, Remote Login, Cloud computing, Mobile based Library Services, Use of Expert Systems and Robotics, Internet of Things, Augmented Reality Tools and Virtual Reality Tools, Semantics, Artificial Intelligence and Machine learning. Satish continues to argue that ICT trends provide many opportunities to improve library management and service delivery. For instance, electronic resource management software, radio frequency identification software (RFID), and cloud computing technology are currently used in libraries to track usage and access authorisation, track library inventory and theft, and provide virtual storage space for library electronic resources, respectively. Adopting these technologies into library service delivery results in 24/7 access to information needed, efficient tracking and management of library materials, increased collaboration and resource sharing among libraries, and increased research productivity in an institution. Nevertheless, the ICT trends in LIS bring along challenges such as changing patron needs, the information landscape, changing information formats, varying information access tools, the high cost of developing and maintaining the technological infrastructure of digital collections due to different human resource skill sets and modes of service delivery (Onuoha & Obialor, 2015).

The LIS professionals must understand these technologies and use them to provide relevant and reliable information to their users (Kaushik et al., 2019). To go along with the changes, it is crucial to understand the various emerging ICT trends in the LIS profession to revamp its education and embed it. This will help the LIS professional to satisfy the information needs of their users in this fourth industrial revolution characterised by the digital revolution, information flood, the Internet of things (IoT), and artificial intelligence (AI) (Ekoja et al., 2022).

The study's objectives were to examine the IT trends in libraries, identify the opportunities for IT trends in libraries, and discuss the challenges of IT trends in libraries.

2 Methodology

A title search was conducted in Google Scholar, Semantic Scholar and Crossref using Harzing's Publish or Perish software. Articles retrieved from each database were screened to untick those not eligible. The remaining articles were exported to different Microsoft Excel spreadsheets. They were then merged into one Excel sheet, and duplicates were removed. The inclusion criteria included peer-reviewed articles published between 2014 and 2024 that had full-text access and discussed information technology trends, challenges, and library opportunities. Snowballing was done to supplement the articles retrieved from the databases based on the relevant articles' reference lists. Although the literature search was extensive, it was exhaustive.

One thousand seven hundred twenty-four articles were retrieved and screened, and 1583 were irrelevant as they did not meet the inclusion criteria. One hundred forty-one articles were merged into Microsoft Excel spreadsheets, of which 56 articles were duplicates and were therefore removed. The remaining abstracts of 85 articles were reviewed, and 65 were excluded as they did not meet all the inclusion criteria. Twenty articles were left for review.

3 Findings

3.1 LIS Profession in the Technological Era

According to Devi and Verma (2015), the LIS profession aims to give information to users at the appropriate time, place, and manner. Librarianship is classified as a profession because it possesses the following fundamental characteristics:

- A corpus of knowledge taught in LIS schools.
- Intensive training and practice to master knowledge organisation and retrieval skills;
- Service orientation;
- Professional associations;
- Standard terminology and practices;
- Code of Ethics.

Librarians were referred to as the custodians of information. Users with information needs were obliged to visit the library to satisfy their needs. Information sources were only available in print media, issued by the librarian, and were time-bound. The library's collection was guided by the community it served. This is, however, changing with the advent of technology. Librarians are no longer the custodians of information.

Consequently, patrons are not obliged to visit the library to satisfy their information needs. This results from the change in information format from print to electronic and the availability of various information storage and access tools such as search engines, databases, and institution repositories.

Libraries are also altering the services they provide, the collections they assemble, and the way they serve their users. This is due to the abundance of information and the various formats in which it is available, which have given rise to new roles for LIS. Verma (2015) studied libraries' changing roles and services in the 21st Century. The study describes the transformative evolution of libraries from the pre-technological to the technological period. According to Verma, libraries changed from one-medium to multi-medium information resources, library centres to libraries without walls, own procurement to procurement through consortia, service in good time to service just on time, local user to universal user, local reach of resources to global reach of resources, and print resources to hybrid resources (Verma, 2015).

These alterations demonstrate how new ICT affects library operations. These days, libraries offer technology-based services (Anand, 2018). These adjustments are necessary and appropriate for today's users. LIS professionals must understand these technologies to offer their users the best services possible (Kaushik et al., 2019). Capacity-building LIS professionals on new ICT trends can significantly impact their understanding of how to use these technologies (Anand, 2018), shifting their perspective from document custodians to information providers (Verma, 2015).

The duties of LIS workers in an information society have altered dramatically. LIS professionals may act in an information society as subject experts, Librarians with extended out-of-the-box responsibilities, Information Managers, Information Advisers/Instructor System and networking Managers, Information Broker for both print and electronic media, Change Agent, that is, Technology Application Leader Facilitator; Educator; Innovator/Website Designer/Manager; Database Manager; Collaborator; Policy Maker; Business Manager; Image Maker; Knowledge Manager (Muthu, 2014). To sustain these multiple roles, LIS professionals must have a variety of abilities, including IT skills, communication skills, management skills, learning and teaching skills, and so on, to run library services effectively and efficiently (Devi & Verma, 2015).

As Satish (2023) stated, an updated Librarian can, therefore, play the role shown in the figure below.



Figure 1: Updated Librarian’s Responsibilities

3.2 Emerging ICT trends in libraries

3.2.1 Internet of Things

There has been much interest in the Internet of Things (IoT) in recent years. The IoT is the network connection of everyday physical things to exchange data via the Internet. It improves service delivery in organisations by enabling devices to communicate directly with the cloud and other devices (Igbिनovia, 2021). Igbिनovia (2021) defines IoT as “the interconnection of everyday objects or things for interaction and data exchange for planning, processing, or decision-making.”

The best-integrated library and library management software (LMS) now uses the Internet of Things (IoT) to communicate data without human involvement. Libraries utilise IoT to manage inventory, deter theft, and identify users. It also contributes to increasing the quality and speed of circulation desk tasks. Furthermore, IoT speeds up book reservations, detects and prevents library fires, and streamlines eLibrary services (Satish, 2023).

3.2.2 Intelligent library search and federated search

Using a single query and search interface, information can be retrieved from multiple information sources via federated search and intelligent library search. The technique facilitates faster information retrieval for main libraries and facilitates indexing. Libraries use this technology for database searching, collection creation, descriptive cataloguing, and subject indexing (Satish, 2023).

3.2.3 Academic integrity and plagiarism

A review of current library system developments would be incomplete if it did not address plagiarism and academic integrity. Using someone else’s words, ideas, theories, pictures, graphics, thoughts, or facts without giving them credit is known as plagiarism. Copying someone else’s work compromises students’ academic experience and intellectual integrity. Avoiding plagiarism has, therefore, become more crucial (Obialor & Onuoha, 2015).

3.2.4 Really Simple Syndication (RSS) feeds

Real Simple Syndication (RSS), also known as Rich Site Summary, is a technology that allows a website (or e-publisher) to list the most recent published updates (such as tables of contents of journals and new articles) using XML technology. It also enables users to follow updates to a particular website via RSS.

Like a personal search assistant, RSS feed readers visit pre-defined websites, search for new content, and download it immediately to the user's desktop. Users can collaborate and republish content on the Internet. Users aggregate content from other websites into one spot, republish content from other websites on their own, and allegedly compress the Web for personal use. Libraries are already setting up RSS feeds to which users can subscribe. These feeds provide information about new objects in collections, new services, and new content in subscription databases. On their websites, they also reprint content (Funmilayo, 2020).

3.2.5 Streaming media

Streaming multimedia and distributing multimedia content over a computer network has been essential applications since before the Web. With computer and network infrastructure availability, library instruction has evolved to include interactive elements, such as multimedia-based tutorials using Flash programming, screen-cast software, or streaming audio or video. Libraries are now archiving and providing access to media through digital repository apps and asset management technology (Arora, 2020).

3.2.6 Tagging

According to Mondal (2020), tags are keywords or subject headings that describe information, allowing for keyword-based classification and search. They are often chosen informally by authors or audiences. Tags are commonly used to identify resources like files and digital photographs. Users can tag their collection in the library, contributing to the cataloguing process. This allows for standardised and user-tagged subjects, resulting in an open, personalised, user-centred catalogue (Funmilayo, 2020).

3.2.7 Social bookmarking services

Social bookmarking is storing, organising, searching, and managing website bookmarks based on descriptive metadata. In a social bookmarking system, users can save links to online pages they want to remember and/or share with others. These bookmarks can be made public, preserved secretly, or shared only with specific individuals or groups. Authorised users can usually examine these bookmarks chronologically, by category or tag, or through a search engine. Most social bookmarking systems encourage users to organise their bookmarks using informal tags rather than the standard browser-based folder structure. At the same time, some services include categories/folders or a mix of folders and tags. These sites also allow you to examine bookmarks connected with a specific tag and learn how many users have bookmarked them. Some social bookmarking services use tag relationships to construct tag or bookmark clusters. Libraries can employ social bookmarking sites with RSS feeds for subjects or areas of specialisation that are relevant to them (Funmilayo, 2020).

3.2.8 Mobile-based library services

A library's three main goals are to promote literacy, provide relevant, everyday information to the public, and inspire lifelong learning through reading materials and tools (Sethy, 2018). Verma (2015) reported that mobile libraries make resources available to users who would not otherwise have access to them. Libraries can use mobile technologies such as SMS and WhatsApp to create new services and provide speedier access to their collections. It also contains a learning management system (LMS), a software application that provides a framework for managing all parts of the learning process and tracking training content. Moodle is one of the top LMS software options available. The OPAC mobile app is a famous example of a mobile library service.

3.2.9 Artificial Intelligence

Artificial intelligence (AI) uses a computer's or robot's capabilities to attempt tasks that people usually complete. Chatbots are libraries' most often used AI applications; they take user inquiries and provide directed responses. They can direct users to the relevant library section, remind them of their book submission date, and schedule appointments for them automatically (Ajakaye, 2021).

3.2.10 RFID Implementation

RFID is a wireless, noncontact technology that uses radio frequency waves to send data from a tag affixed to an item, allowing it to be tracked and identified. RFID enables institutions such as libraries to implement self-service functions, maintain security, and monitor operations. Integrating IoT and RFID technology improves device communication by utilising radio frequency waves for data sharing. As a result, businesses employing the IoT framework can connect all kinds of items without using transducers, such as wireless sensors and actuators (Igbinovia, 2021).

RFID employs electromagnetic fields to choose automatically, and track tags affixed to library items. The RFID-based library management system is the most recent technology used to maintain inventory and improve library theft detection systems. This technology improves library security while increasing productivity by streamlining operations and eliminating human dependence. RFID helps users speed up the borrowing and returning processes. Consequently, RFID saves time and lowers library expenditures (Satish, 2023).

3.2.11 Electronic Resource Management

Electronic resources include e-journals, e-books, online databases, and other digital products that may be accessed electronically. Libraries can use e-Resource Management Software to track the collection, access, authorisation, maintenance, usage, evaluation, reservation, and selection of electronic information resources (Mohan, 2015).

3.3 Challenges of emerging ICT trends in libraries

The information age requires library workers to manage knowledge and grow personally because of the proliferation of information. Social shifts affect one's obligations, career opportunities, and self-perception. The current state of libraries has presented LIS professionals with new issues and difficulties due to the shift from print to hybrid collections that include electronic (online and offline) and print resources; automated systems have replaced manual systems for organising these materials; manual library services have given way to web-based library services; and so forth (Ashikuzzaman, 2021). Librarians' functions are significantly impacted by emerging ICT in LIS professionals.

Library workers encounter several issues when using ICT to disseminate information in libraries. The greatest challenge facing library workers today is the rapid growth in published literature. Information that has been released worldwide must be managed by library experts and distributed to information seekers. The majority of information is shared via ICT. Consequently, to provide clients with effective and efficient library services, they must be trained to stay up-to-date with the most recent technological advancements.

Another problem that affects library staff is inadequate technology infrastructure. This includes a dearth of national ICT policies, a shortage of PCs in libraries, inadequate Internet connectivity, and a finite amount of electricity. Regulations that control ISPs govern government and cross-border data flows, deregulate satellite communication and other telecommunication lines, and so forth are essential. ICT policies can mitigate the effects of strict tax regimes that still view peripherals such as computers and communication equipment as luxury goods, leading to exorbitant import duties and unreasonably high prices (Jamuna & Dhanamjaya, 2021).

Old technology becomes outdated due to the quick advancement and modification of technology. Because of this, library workers must be ready to pick up new skills and adjust to new technology to operate their libraries' daily operations successfully and efficiently.

Adequate funding is essential to sustain the standards and quality of library services. Most libraries face funding issues in many of their functions. The fast pace and transient nature of technological advancement necessitate ongoing investment.

High-level technical support is essential to maintaining ICT in libraries. Library staff members must comprehend, utilise, and showcase developing technologies. Theresa and Revathi (2013) distinguished two unique problems requiring technical know-how. To begin with, not enough individuals are qualified for or are learning ICT-specific skills at the pace at which new technologies are being introduced. The second problem is brain drain, which is a phenomenon where some specialists depart for higher-paying occupations (Devi & Verma, 2015).

Technology-related stress. Technological stress is one of the biggest obstacles to using ICTs in the modern world. Technostress is defined as a novel adaptation problem brought on by an inability to make a healthy adjustment to contemporary computer technology. This could manifest as an over-identification with computers or a reluctance to adopt them. A negative psychological relationship between people and newly introduced technologies is another definition of technostress. Its five components are technological overload, invasion, complexity, insecurity, and uncertainty. In recent years, considerable effort has been put into improving library operations and service delivery by implementing cutting-edge concepts and technologies. The adverse physiological and psychological reactions that people experience to newly introduced technology are often the root cause of technostress (Olorunfemi & Adekoya, 2023).

3.4 Opportunities in emerging ICT trends in libraries

The library's issues have improved LIS personnel's ICT skills. Many corporations, government institutions, and institutions of higher learning offer LIS professionals ICT training so that they may stay abreast with the changes and trends in the library software used in the libraries (Kaushik et al., 2019).

Changes in the library system, particularly consortia acquisition, library networking for sharing of resources, interlibrary lending, provision of "walk-in users" in libraries, organisational membership of libraries, library publication activities, better marketing of library products and services, and so on, helped libraries to be economically viable daily despite reduced library budgets. Furthermore, various funding (both government and private), financial and labour help for library automation, the availability of open source software, and so on have considerably aided libraries in managing efficiently within a limited budget. (Mohammed et al., 2022).

Library services have evolved significantly since the introduction of ICT. The circulation area allows LIS personnel to check out and check in library materials more quickly through the library system (Devi & Verma, 2015). Thanks to Web OPAC, document searching has been made easier for users. OPAC also assists in determining the exact placement on the shelf for a specific library and how many copies of a particular document are available in the library, whether issued or not. Depending on the library software, reservations are also possible.

RFID technology is helpful for library transactions, inventory management, and theft detection. It automatically identifies and tracks the products using an identifying chip or tag. (Devi & Verma, 2015).

ICT apps enable libraries to manage and track ILL requests, send reminders, track monetary computations, and update users. Libraries use RSS feeds for communication, "Ask a Librarian" for real-time reference assistance, and social networking sites for marketing and information sharing. Website blogs can be used for book reviews, discussions, and job postings (Kaushik et al., 2019; Mohan, 2015).

The number of career prospects for LIS specialists has expanded significantly since the early days. Qualified experts can be hired in various settings, including libraries, information centres, research institutions, and corporations. New graduates can obtain hands-on experience by applying for the "Library trainee" position, which prepares them for better positions in the future.

According to Olubiyo (2022), the multiple changes to the library system and services have given LIS professionals and students greater control over research and publication activities. This has resulted in the

publication of a large number of books, both in print and online, worldwide. There are also many LIS PhD holders, which has boosted the reputation of the LIS profession and its practitioners.

Inforpreneurship is another opportunity presented to LIS professionals by emerging ICT trends (Mohammed et al., 2022). These online businesses sell their expertise worldwide by “repackaging and marketing their knowledge as information-based products, online services, and premium consultancy” (El-Kalash et al., 2016). According to Mohammed et al. (2022), some of these businesses are Information brokerage, information system consultancy, blogging and advertising, web development, database design, and Internet café.

Information brokers are individuals who search for information for the client for a fee. They typically have a deep understanding of the information landscape and can quickly identify and locate relevant information sources for their clients. Information brokers use electronic resources such as the Internet, databases, electronic libraries, books, and journals to source credible and relevant information for their clients (Mohammed et al., 2022). ICT, information retrieval, storage, and dissemination are required.

4 Discussion

The literature study focuses on recent and emerging ICT trends in the library profession. It also examines the problems and opportunities created by these trends. The study’s findings demonstrate that in today’s information society, ICTs are essential in libraries since they serve as the central engine of library growth and transformation. According to Olorunfemi and Adekoya (2023), automation software has transformed library operations from relying mainly on human labour to utilising technology to complete essential library duties. Librarians now employ ICTs to preserve records, store data, access information, and disseminate it.

WebOPAC, library websites, automation software, digital repositories, social media, mobile apps, digital resources, e-readers, RFID, barcodes, QR codes, cloud printing, web 2.0 and 3.0 technologies, and so on have all had an impact on library services in this digital age. According to Devi and Verma (2015), library professionals must adapt to the information age by managing knowledge and developing themselves. Societal changes impact responsibilities, job possibilities, and self-image. The recent library environment presents new challenges due to hybrid collection, automated systems, and shifts from manual to web-based services, significantly impacting library worker roles. As outlined in Swayam, librarianship has metamorphosed based on the needs of society and the growth of ICTS. This has led to various opportunities and challenges for the profession. Some of the identified challenges include changing user needs, developing a diverse pull of human resources with diverse skill sets for managing the new system, coping with increasing financial constraints, and technostress, among others.

The opportunities brought by the emerging trends, as discussed by Devi and Verma (2015), Mohammed et al. (2022) and Kaushik et al. (2019), include and are not limited to Increased job opportunities for LIS professionals, more significant influence towards research and publication activities, real-time reference services, easier to check-out and check-in library materials through the use of library management system, consortia mode of procurement, provision of ICT training facilities and intrapreneurship.

5 Conclusion

In today’s digital age, emerging technologies provide librarians a unique opportunity to significantly enhance user-centred services while encouraging and enabling collaboration between libraries and their users. Adapting to some of these trends and implementing them is likely to boost libraries’ status in the community. Some of these may be beneficial in attracting new library patrons. In contrast, others may help to retain the existing patrons or increase the importance of libraries as cultural and historical centres

in their communities and academic institutions. These new developments make libraries more appealing, relevant, and acceptable. LIS schools are adapting their syllabuses to meet these challenges, producing ICT-skilled professionals. These professionals can pursue careers in the public, government, and private sectors, ensuring they meet the current job requirements and have ample career opportunities.

6 Recommendations

In light of the findings, the study offers the following recommendations:

- Implement a structured capacity-building program to continuously enhance the skills and knowledge of LIS professionals, ensuring they remain abreast of emerging ICT trends.
- A comprehensive LIS curriculum review is to be undertaken to allow adaptation and integration of modules that address emerging ICT trends. This may include hands-on experience through attachment and stakeholder collaboration, providing practical opportunities for LIS professionals.
- Library national bodies to establish a system of continuous assessment of LIS curricula, focusing on offering continuous professional development (CPD), points to librarians attending the training that aligns with emerging trends and opportunities in LIS professionals.
- Foster a culture of research and innovation in the LIS profession that focuses on emerging ICT trends. This could involve funding research initiatives focusing on ICT trends in the LIS profession.
- Advocate for adequate financial allocation to LIS departments to address the evolving information landscape due to ICT in the LIS profession, including investments in infrastructure and skilled personnel. This will ensure that LIS professionals have the resources to navigate and utilise emerging technologies effectively.

References

- Abubakar, B. M. (2021). Library and Information Science (LIS) Education in Nigeria: Emerging Trends, Challenges and Expectations in the Digital Age. *Journal of Balkan Libraries Union*, 8(1).
- Ajakaye, J. (2021). Applications-of-Artificial-Intelligence-(AI)-in-Libraries. In *Handbook of research on emerging trends and technologies in librarianship* (pp. 73–90). IGI Global.
- Anand, R. (2018). *Capacity Building of Library Professionals in the Digital Environment A Study of Universities of Karnataka State*.
- Arora, J. (2020). Library 2.0: Innovative Technologies for Building Libraries of Tomorrow. *Open Access to Textual and Multimedia Content: Bridging the Digital Divide*. ETTLIS, India.
- Ashikuzzaman, M. (2021, January 3). Impact of ICT in Library and Society. *Library & Information Science Education Network*.
- Devi, D., & Verma, M. (2015, December 31). *Impact of Information Communication Technology in LIS Career: A brief review*.
- Ekoja, I. I., Ogbomo, E. F., & Okuonghae, O. (2022). *Handbook of Research on Emerging Trends and Technologies in Librarianship*.
- El-Kalash, K. I., Mohammed, S. B., & Aniki, M. Y. (2016). Exploring infopreneurship for economic growth and sustainability in a developing economy: The Nigeria perspective. *Journal of Educational Policy and Entrepreneurial Research (JEPER)*, 3(7), 240–249.

- Funmilayo, A. O. R. (2020). Global Trends and Emerging Technologies in Libraries and Information Science. *Library Philosophy and Practice (e-Journal)*.
- Harzing, A.W. (2023, August 12). *Using the Publish or Perish software*. Harzing.Com. <https://harzing.com/publications/using-the-publish-or-perish-software>
- Igbinoia, M. O. (2021). The Internet of Things in libraries will focus on its adoption in developing countries. *Library Hi Tech News*, 38(4), 13–17
- Jamuna, K., & Dhananjaya, M. (2021). Impact and Usage of E-Resources: A Literature Review. *Library Philosophy and Practice (e-Journal)*.
- Kaushik, A., Kumar, A., & Biswas, P. (2019). *Handbook of Research on Emerging Trends and Technologies in Library and Information Science*.
- Mohammed, A. Z., Gora, A. A. L., Usman, M. A., & Ibrahim, M. (2022). Inforpreneurship: Opportunities and Challenges for Library and Information Science Professionals in 21st Century. *Asian Journal of Information Science and Technology*, 12(2), 22–28.
- Mohan, R. (2015). Uses of Electronic Information Resources by Faculty Members in MIT College Library, Moradabad: A Survey. *NCITE' 2015*, p. 14.
- Mondal, H. (2020). *The Library: Changing Role and Services in 21st Century's Information Societies*. 10.
- Muthu, M. M. (2014). Competencies, Types and their Strategic Thinking for LIS Professionals in Modern Era. *International Journal of Librarianship and Administration*, 5(1), 61–80.
- Olorunfemi, M., & Adekoya, C. O. (2023). Technostress and information and communication technology usage among librarians in Nigerian universities. *Global Knowledge, Memory and Communication, ahead-of-print* (ahead-of-print).
- Olubiyo, P. (2022). Library and Information Science (LIS) Education in the 21st Century: Emerging Skills for a Changing World. *Library Philosophy and Practice (e-Journal)*.
- Onuoha, J. A., & Obialor, D. C. (2015). The Impact of Information Technology on Modern Librarianship: A Reflective Study. *Information and Knowledge Management*, 5(11).
- Satish. (2023, March 2). Emerging Trends & Technologies in Library & Information Services. *Algorithms*.
- Swayam. (2020). *Emerging Trends & Technologies in Library & Information Services (ETTLIS): Online Course* [Librarianship Studies & Information Technology].
- Verma, M. K. (2015). The changing role of library professional in the digital environment: A study. *International Journal of Library Science*, 13(2), 96–104.