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ICT Proficiency in Library and Information Science Professionals: A Systematic Review

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Abstract:

Purpose: The proficiency of ICT-skilled and competent personnel plays a crucial role in delivering library services to globally connected users. However, amidst rapidly evolving technological landscapes and the diverse perceptions of hybrid users, Library and Information Science (LIS) professionals face the challenge of keeping pace with their communities' and institutions' expected ICT competencies. Additionally, there is a growing need for LIS professionals to possess diverse skill sets and competencies. Thus, this research aims to explore LIS professionals' ICT skills and competencies across various dimensions through a comprehensive literature review.

Design/methodology/approach:- This study utilized a systematic literature review (SLR) following the PRISMA framework. Three major databases (Scopus, Web of Science, and ProQuest LISA) were selected for data collection. 2114 articles were initially identified using a Boolean search strategy, supplemented by 05 articles from the researcher's collection from 2020 to March 2024. Subsequently, 21 research articles were meticulously selected based on predefined inclusion and exclusion criteria. EndNote online and MS Excel were employed for efficient article screening.

Findings:- Most selected articles predominantly employed quantitative research methodologies, often questionnaire instruments. Notably, contributions from Nigeria and Pakistan, along with the journal Library Philosophy and Practice, stood out in terms of research output. While most LIS professionals demonstrate proficiency in basic computer operations and digital literacy, a notable deficiency in advanced ICT skills is crucial for contemporary library services. Common avenues for skill enhancement include participation in conferences, workshops, training sessions, and seminars. However, several obstacles hinder skill development, including limited funding, lack of organizational support, inadequate training opportunities, subpar infrastructure, absence of policies, time constraints, and passive attitudes among staff. Notably, there is a pronounced

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need for training in technology management for intelligent libraries. Continuous Education Programs (CEP) and Professional Development Programs (PDP) enhance overall staff proficiency, underscoring the importance of organizational support in facilitating skill development initiatives.

Research limitations/implications:- This study is limited by the selection of databases and the predefined search criteria. However, it provides valuable insights into LIS professionals' current status, skills, and competencies, thereby guiding the identification of areas requiring targeted training interventions.

Originality:- By shedding light on LIS professionals' ICT skills and competencies, this study serves as a valuable resource for assessing training needs and informing strategic interventions to enhance library personnel's capabilities.

Keywords: *Skills and competencies; Professional development program; LIS professionals; Libraries; PDP; Library services; ICT skills; Trainings.*

1. Introduction

Embracing technology accelerates work processes, rendering them swifter, more efficient, and transparent. The proliferation of advanced technologies exerts pressure on individuals to incorporate them into personal and professional spheres. Traditional office systems are transitioning into digitized formats across various sectors like academia, banking, business, and government. Likewise, libraries are digitizing their systems, facilitating global information sharing and enabling prompt responses to digital content.

Moreover, the imperative to safeguard information against both man-made and natural disasters necessitate the digitalization of library systems, services, and collections. However, the diverse needs of libraries, characterized by hybrid collections, services, and users, mean that more than a singular application may be required. Hence, librarians must explore and adopt various Information and Communication Technology (ICT) applications tailored to library purposes. Nevertheless, the efficacy of technology hinges on the availability of skilled human resources. In addition to conventional library and information science expertise, proficiency in technology-related skills is essential for navigating and leveraging Information and Communication Technology (ICT), as highlighted by Tran (2023). Okwu & Nsirim (2021) underscore the correlation between librarians' competencies in information retrieval and collaborative tools and their utilization of emerging technologies in academic libraries.

Continuous professional development (CPD) programs are crucial for updating and enhancing professional knowledge and skills, particularly in the dynamic landscape of ICT and libraries. However, Library and Information Science (LIS) professionals often face challenges in adopting and managing ICT applications without a formal background in I.T. Consequently, conferences, workshops, seminars, and training sessions serve as popular avenues for skill acquisition, with in-service training proving most effective for honing specific competencies. Nevertheless, LIS professionals in developing countries encounter barriers such as financial constraints, inadequate infrastructure, policy gaps, limited resources, personnel attitudes, and time constraints when accessing CPD programs. Hence, this paper draws from prior literature to delineate the skills,

competencies, and associated challenges confronting LIS professionals, aiming to inform strategies for addressing these pressing issues.

2. Research questions

(i) What is the current assessment of the skills and competencies of Library and Information Science (LIS) professionals as discussed in existing literature?

(ii) Which Information and Communication Technology (ICT) skills and competencies are essential for modern library operations, as identified by LIS professionals?

(iii) What strategies are employed to attain ICT skills and competencies among LIS professionals?

(iv) What obstacles do LIS professionals encounter in their Continuous Professional Development (CPD) endeavours?

(v) How do LIS professionals perceive their field's future trajectory of skills and competencies?

3. Methodology

This study employs the systematic literature review (SLR) methodology in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. SLR is a rigorous and scientifically sound approach for systematically locating and analyzing research findings. PRISMA guidelines facilitate the systematic search, screening, and selection of papers based on the research questions for further review. The PRISMA framework serves as the foundation for SLR, enabling the exploration of key themes in existing literature to address the research questions. The following stages are undertaken to fulfill the task by PRISMA guidelines by Ashiq et al. (2021), Madhusudhan & Pandey (2023), and Pandey & Madhusudhan (2024).

3.1 Planning stage

We meticulously gathered and analyzed over fifteen articles concerning "ICT skills and competencies for modern libraries" published between 2015 and 2024 during this phase. We thoroughly examined the Abstracts, highlighted the authors' keywords, and formulated a search strategy based on the prevalent and frequently recurring keywords pertinent to our research. Subsequently, we devised a comprehensive search strategy to be implemented across selected databases. Simultaneously, we established inclusion and exclusion criteria to screen the identified papers efficiently using the designated search strategies.

Table 1: Inclusion and exclusion criteria.

Inclusive and Exclusive Criteria
Inclusive Criteria
• Document related to ICT skills and competency of LIS professionals
• The document type includes only articles.
• The document language is English.
• Source type only Journal
Exclusive Criteria

• Document includes review papers, conference proceedings, and book chapters.
• The document is written in a non-English language.
• The document does not have an abstract.
• The document related to ICT skills and competencies of school librarians

The search strategy was prepared using Boolean operators as "library staff" OR "LIS professionals" OR librarians OR librar* AND "ICT skills" OR "ICT competencies" OR "skills and competencies" OR "ICT proficiency" NOT "school librarian" NOT "School libraries" NOT medical NOT clinical NOT nursing NOT hospital

3.2 Conducting stage

The search strategy was collaboratively discussed, refined, and finalized with co-authors at this stage. Subsequently, the strategy was implemented on the Web of Science and Scopus databases. These databases were chosen due to their extensive coverage of multidisciplinary, high-quality peer-reviewed journals, encompassing library and information science.

Advanced search techniques were employed, targeting specific fields within each database. In Scopus, the search encompassed Article titles, Abstracts, and Keywords. Web of Science spanned across all fields, while in the ProQuest LISSA database, searches were conducted comprehensively, covering all available fields.

Documents retrieved were refined based on language, document type, and source type. In Web of Science, the date range was constrained from 2020 to 2024, focusing solely on articles in the English language and sourced from journals. Similarly, in Scopus, only articles published between 2020 and 2024 were considered, with a restriction to English language and journal sources.

A total of 2,119 articles were identified, distributed across ProQuest LISSA (1,711 articles), Web of Science (278 articles), Scopus (125 articles), and author's self folder (05) as of 09/03/2024. All documents meeting the criteria were selected and imported into EndNote Online in RIS format. Additionally, they were downloaded as a CSV file for thematic review.

The chosen timeframe, from 2020 to the present, reflects the evolving role of librarians amidst rapid technological advancements and the impact of the COVID-19 pandemic. Technologically proficient users now expect information to be readily accessible at their fingertips, necessitating librarians to adopt cutting-edge technologies in their service delivery. This evolving landscape underscores the importance of librarians continuously enhancing their skills and competencies to meet their patrons' needs effectively.

3.3 Synthesis and screening stage

In this stage, researchers eliminated duplicate articles (n=27), and the remaining articles (n=2092) were selected for title and abstract review. A total of 2058 unrelated articles were again excluded from the records. The remaining 34 articles were preferred for full-text access; however, two articles could not be accessed by the authors. Additionally, 11 articles were quit as they did not meet the objectives of this study. A total of 21 articles were suitable for further deep analysis for descriptive and thematic analysis.

4. Data analysis and interpretation

4.1 Descriptive analysis

The researcher meticulously crafted a thorough search strategy tailored to this study's research questions and objectives. This strategy involved scouring three databases, yielding access to 2114 articles supplemented by five additional sources. Subsequently, a meticulous screening process was conducted, wherein 21 articles were selected for comprehensive review to ensure coverage of the research questions.

Table 2: Contribution details of authors, countries, and years

Collaboration		Countries		Published Years	
Single author	1(38.10%)	Nigeria	8 (38.10%)	2020	6 (28.57%)
Double authors	13(33.33%)	Pakistan	7 (33.33%)	2021	7 (33.33%)
More than two authors	7(28.57%)	Nepal, Hungary, Viet Nam, Africa, Kenya, India	6(28.57%)	2022	3(14.29%)
				2023	5(23.81%)
Total	21(100%)		21(100%)	Total	21(100%)

Upon analyzing twenty-one articles (as depicted in Table 2), it is evident that thirteen articles, constituting 33.33%, were collaboratively authored. Additionally, seven articles (28.57%) involved more than two authors, while a solitary author undertook the study in only one instance. This underscores the preference for collaborative endeavours in research pursuits, indicating a prevalent networking trend among authors. Notably, in terms of national productivity, articles from Nigeria accounted for 8 (38.10%) of the total, followed closely by Pakistan with 7 (33.33%), while the remaining 6 (28.57%) originated from various other countries. This highlights the significant contributions of Nigerian and Pakistani researchers in exploring the skills and competencies pertinent to Library and Information Science (LIS) professions in the digital Artificial Intelligence (AI) era. Furthermore, the data reveals that 2021 exhibited the highest productivity, succeeded by 2020, 2023, and 2022, possibly attributable to the challenges posed by the Covid-19 pandemic. Libraries were compelled to adapt by providing digital services, wherein the skills and competencies of librarians played a pivotal role.

Table 3: Contribution of Journals

Sl. No.	Journal Name	Qty(%)
1	Library Philosophy and Practice	10 (47.61%)
2	Information Development	02 (09.53%)
3	Library management	02 (09.53%)

4	Digital Library Perspectives	02 (09.53%)
5	Journal of Librarianship and Information Science	01 (04.76%)
6	Global Scientific	01 (04.76%)
7	Global Knowledge Memory and Communication	01 (04.76%)
8	Performance Measurement and Metrics	01 (04.76%)
9	LIS Today	01 (04.76%)
	Total	21 (100%)

Table 3 illustrates the distribution of insights from articles concerning ICT skills and LIS professionals' competencies across prominent library science journals. Among the nine journals examined, Library Philosophy and Practice has the highest % of articles at 47.61%. Information Development, Library Management, and Digital Library Perspectives are closely behind, each contributing 9.53%. The remaining five journals—Journal of Librarianship and Information Science, Global Scientific, Global Knowledge Memory and Communication, Performance Measurement and Metrics, and LIS Today—account for 4.76% of the articles in this domain.

Table 4: Methodological details of included articles

Method		Sampling technique		Instrument used	
Quantitative	19(90.48%)	Census Sampling	4(19.05%)	Questionnaire	19 (90.48%)
Qualitative	1(4.76%)	Random sampling	3(14.29%)	Interview	1(4.76%)
Mixed approach	1(4.76%)	Purposive	3(14.29%)	Questionnaire and interview	1(4.76%)
		Enumerated sampling	1(4.76%)		
		N.A.	10(47.61%)		
Total	21(100%)	Total	21(100%)	Total	21(100%)

In the methodology section (Table 4), out of 21 articles reviewed, a majority (90.48%) employed a quantitative approach, utilizing questionnaire instruments (90.48%) for data gathering. However, a significant portion of articles (47.61%) still need to specify their sampling techniques despite the implementation of various methods, including census sampling (19.05%), random sampling (14.29%), and purposive sampling (14.29%). The sample sizes across quantitative research articles varied widely, ranging from n=5 for pilot studies to a maximum of n=1868. For qualitative approaches, the sample size typically stood at 10.

Researchers predominantly used Google Forms, distributed through email and social media platforms such as LinkedIn, Facebook, and WhatsApp, for data collection. Additionally, self-administered and postal delivery methods were employed. In qualitative research, data collection predominantly relied on interviews (refer to **Appendix I).**

4.2 Thematic analysis

The investigation encompassed twenty-one research articles following meticulous screening based on predefined inclusion and exclusion criteria. The study was categorized into six distinct facets utilizing a thematic approach following a thorough examination.

4.2.1 ICT skills and competencies

The evolution of ICT is marked by a rich history, navigating through various stages, culminating in the era of AI we find ourselves in today. This rapid advancement continuously poses challenges to individuals, urging them to adapt to the ever-changing landscape of ICT applications. As we enter this new phase, characterized by cutting-edge technologies that are often complex to implement, the acquisition of adaptable skills becomes paramount. Beyond foundational knowledge, LIS professionals must possess diverse competencies across both basic and advanced levels, tailored to the dynamic spectrum of ICT applications. This versatility is essential for maintaining relevance and competence within the community. Furthermore, there is a pressing need to enhance the delivery of resources, services, and collections to meet the demands of tech-savvy users.

After reviewing the included articles in this study, most of the LIS staff have good skills in Windows (Hussain & Nayab, 2021; Nagappa & K.T., 2020; Munawar et al., 2021) and Linux (Hussain & Nayab, 2021; Munawar et al., 2021) operating system. Library automation integrates all the functional operations in a single yard. For this purpose, different ILS software is explored on both an open-source and a commercial basis. However, LIS professionals should have the knowledge and skills to implement these applications. INMAGIC, Insingnia, CDS/ISIS, LAMP (Hussain & Nayab, 2021), Koha (Hussain & Nayab, 2021; Munawar et al., 2021), E-granthalaya (Nagappa & K.T., 2020), LIMS and Virtua (Munawar et al., 2021) found sound skill in LIS professionals in their libraries. Repository software plays a significant role in systematically organizing institutional records (grey literature) and electronic resources. Munawar et al. (2021) found that LIS professionals have good library skills with DSpace and Fedora software. In two studies, LIS staff had skills for database creation and updating (Akintonde & Awujoola, 2022), web page designing, and bibliographic databases (Hussain & Nayab, 2021). Web-based technologies bridge the gap between libraries and users. These technologies support the conversation, deliberation, and dissemination of the services. Web technological skills (Agava & Underwood, 2020), web applications skills (Ntuboderia et al., 2023) and Wikis skills (Hussain & Nayab, 2021) found an excellent level of proficiency in their staff.

Other skills like internet surfing skills (Subaveerapandiyam et al., 2022), library networking skills, cloud technology skills (Ntuboderia et al., 2023), webinar/ video conference application skills (Idhalama et al., 2021) found admirable levels in their LIS staffs. The skills to search for information on the Internet are crucial to increasing the precision ratio of required information. Skills towards simple searching techniques (Abbas & Siddique, 2020), searching e-books (Moruwawon & Kumar, 2022), and searching e-journals (Hussain & Nayab, 2021) were found to be at a reasonable level. LIS staff used their skills to manage email, web browsers, social media networks, and search engines (Hussain & Nayab, 2021; Abbas & Siddique, 2020; Moruwawon

& Kumar, 2022). Basic digital literacy skills have become the foundation for all other ICT skills.

Most of the LIS professionals had M.S. Word/word processing (Hussain & Nayab, 2021; Nagappa & K.T., 2020; Abbas & Siddique, 2020; Munawar et al., 2021; Akintonde & Awujoola, 2022; Subaveerapandiyam et al., 2022; Moruwawon & Kumar, 2022; Ohanaga et al., 2021) M.S. PowerPoint, MS Excel (Hussain & Nayab, 2021; Nagappa & K.T., 2020; Abbas & Siddique, 2020; Munawar et al., 2021), M.S. Access (Hussain & Nayab, 2021; Nagappa & K.T., 2020; Munawar et al., 2021), basic computer operation (Emezie et al., 2023; Moruwawon & Kumar, 2022), computing skills (Akintonde & Awujoola, 2022), photoshop, In-page (Hussain & Nayab, 2021; Nagappa & K.T., 2020) and other skills like printing, creating files/folders, copying files, etc found excellent level (Akintonde & Awujoola, 2022; Moruwawon & Kumar, 2022).

LIS staff are expected to possess proficient ICT skills and knowledge to operate the evolving ICT-driven library services effectively. However, several studies have indicated that some LIS professionals exhibit a moderate level of proficiency in various areas such as hardware and software installation, basic hardware understanding, security systems, development of Institutional Repositories (IR), content management systems, utilization of digital library software, RFID technology, digitization processes, Unix Operating Systems (OS), content development, web technology design and development, utilization of discovery tools, cloud computing, database searching, advanced searching techniques, and metadata creation. These findings were highlighted in studies conducted by Abbas & Siddique (2020), Subaveerapandiyam et al. (2022), Nagappa & KT (2020), Hussain & Nayab (2021), Emezie et al. (2023), and Borbely & Nemethi-Takacs (2023).

4.2.2 Scope to take skills and competencies **With the exception of a few rare cases, most LIS professionals are eager to enhance and expand their existing skills and knowledge to elevate library services. Proficiency in various aspects of ICT is common among them. However, studies indicate a demand for further expertise in areas such as library automation software, application software, bibliographic databases, search methodologies, and the evaluation of online resources (Hussan & Nayab, 2021).**

A substantial portion of research underscores the expressed interest of LIS staff in acquiring skills related to web page design (Hussan & Nayab, 2021; Nagappa & KT, 2020; Ohanaga et al., 2021; Oyovwe-Tinoye et al., 2021). Additionally, there is a notable desire among them to develop proficiency in IR or digital library software for creating and managing digital repositories (Hussan & Nayab, 2021; Nagappa & KT, 2020).

Furthermore, there is a recognized need for improvement in skills such as RFID utilization, Photoshop proficiency (Nagappa & KT, 2020), scanning and digital conversion abilities, metadata creation (Emezie et al., 2023), familiarity with specialized library software, technical troubleshooting, utilization of online tools, and engagement with web applications including webinar and digital conferencing platforms, as well as web 2.0 technologies (Oyovwe-Tinoye et al., 2021).

Moreover, attention must be directed towards enhancing competencies in academic writing applications, plagiarism detection tools, security protocols, citation management systems, statistical analysis and data visualization tools, web navigation techniques, video/audio streaming platforms, learning management systems, content management systems, institutional repository management, ILMS, collaborative web-based applications, mobile applications, and emerging AI technologies to remain current in the field.

A solid grasp of internet surfing and browsing skills (Subaveerapandiyam et al., 2022) can give LIS staff a distinct advantage in managing diverse tasks and enhancing overall job performance. Thus, LIS professionals must prioritize acquiring skills and competencies related to the field's array of tools and technologies.

4.2.3 Methods to acquire ICT skills and competencies

An academic degree lays the groundwork for essential knowledge and skills to embark on an early career path. Consequently, a commitment to continual learning becomes imperative to enhance and refresh one's existing expertise. Various avenues exist for acquiring ICT skills, depending on their practicality and applicability.

In a recent study by Hussain and Nayab (2021), it was observed that formal education, self-directed learning through peers, visits to other institutions, curriculum offerings at LIS (Library and Information Science) schools, and online tutorials are among the methods embraced by professionals to attain ICT proficiency. Furthermore, workshops, seminars, and conferences (Hussain & Nayab, 2021; Abbas & Siddique, 2020; Oyovwe-Tinoye et al., 2021; Ohanaga et al., 2021), personal practice (Abbas & Siddique, 2020), and on-the-job training (Ohanaga et al., 2021) are recognized strategies endorsed by LIS professionals to acquire ICT skills.

Additionally, pre-service training, informal learning from colleagues and friends, trial and error approaches, refresher courses, orientation programs, online tutorials, and Massive Open Online Courses (MOOCs) are supplementary pathways for individuals seeking to develop ICT competencies.

4.2.4 Hindrance to acquire ICT skills

Ensuring the modernization and enhancement of the LIS profession through ICT skills and competencies requires active participation in CPD programs. These initiatives are typically conducted in collaboration with institutions or professional associations. Adequate institutional support, budget allocations, resources, and active participation from stakeholders are essential for the success of these programs. However, despite their importance, some obstacles hinder LIS professionals from fully engaging in CPD programs, as evidenced by various studies.

S.N.	Hindrance Source	
1	Lack of initiative from professional associations to conduct training programs	Hussain & Nayab, 2021)
2	Lack of budget and little funds allocate for PDP programs	(Hussain & Nayab, 2021; Nagappa & K.T., 2020 Subaveerapandiyam, et al, 2022; Agava & Underwood, 2020; Ahmed & Rasheed, 2020; Oyovwe-Tinoye et al 2021; Ohanaga et al., 2021; Pandey & Madhusudhan, 20223)
3	Limited opportunities provided for staff	(Hussain & Nayab, 2021)
4	Coordination issues among library staff	(Hussain & Nayab, 2021; Pandey & Madhusudhan, 20223)
5	Lack of written continuing professional development (CPD) policies	(Hussain & Nayab, 2021)
6	Lack of ICT resource persons and faculties	(Hussain & Nayab, 2021; Khan & Bhatti, 2020)
7	Tight working schedule	(Hussain & Nayab, 2021)
8	Lack of sufficient staff in the library	(Hussain & Nayab, 2021)
9	Lack of ICT infrastructure	(Khan & Bhatti, 2020; Nagappa & K.T., 2020; Ahmed & Rasheed, 2020; Pandey & Madhusudhan, 20223)
10	Limited training opportunities in ICT applications	(Nagappa & K.T., 2020; Khan & Bhatti, 2020; Agava & Underwood, 2020; Ahmed & Rasheed, 2020; Oyovwe-Tinoye et al 2021; Ohanaga et al., 2021; Pandey & Madhusudhan, 20223; Hussain & Nayab, 2021)
11	Non-availability of consultation services	(Nagappa & K.T., 2020)
12	Overload of working hours in government and aided institutions in that region	(Nagappa & K.T., 2020)
13	Lack of self-interest and motivation	(Khan & Bhatti, 2020; Agava & Underwood, 2020; Ahmed & Rasheed, 2020)
14	Time constraints	(Agava & Underwood, 2020; Oyovwe-Tinoye et al 2021)
15	Lack of practical lessons	(Agava & Underwood, 2020)
16	Lack of ICT obsolescence	(Agava & Underwood, 2020)

17	Lack of support for an organization	(Ahmed & Rasheed, 2020)
18	Poor planning and implementing	(Oyovwe-Tinoye et al. 2021)
19	Non-sponsorship of librarians	(Oyovwe-Tinoye et al. 2021)
20	Absence of policy for evaluation and assessment	(Oyovwe-Tinoye et al. 2021)
21	Higher authorities not willing to release their staff to go for further training	(Ohanaga et al., 2021)
22	Inadequate curriculum content for ICT in library schools	(Ohanaga et al., 2021)

4.2.5 Recommended by authors

LIS professionals encounter challenges in acquiring ICT skills and competencies, including financial constraints, lack of recognition of the library profession by authorities, outdated academic curricula, passive staff attitudes, inadequate infrastructure, limited resources, and more. In response, the authors propose several solutions to address these issues and assist LIS staff in enhancing their proficiency:

a) Library management should consistently organize training sessions for LIS professionals to improve their skills and competencies in the latest emerging ICT areas (Hussain & Nayab, 2021; Nagappa & K.T., 2020; Abbas & Siddique, 2020; Akintonde & Awujoola, 2022; Subaveerapandiyam et al., 2022; Ntuboderia et al., 2023; Oyovwe-Tinoye et al., 2021; Moruwawon & Kumar, 2022).

b) Professional associations, LIS groups, and schools should collaborate to host ICT-related professional development programs (Hussain & Nayab, 2021; Abbas & Siddique, 2020).

c) Library professionals should actively develop their specialized skills in emerging ICT areas and encourage their colleagues to participate in professional development programs (Hussain & Nayab, 2021; Agava & Underwood, 2020; Ahmed & Sheikh, 2020).

d) Institutions should support sending librarians to professional development programs such as seminars, conferences, and workshops (Nagappa & K.T., 2020).

e) Authorities should allocate additional staff to manage workloads during participation in professional development programs (Nagappa & K.T., 2020; Ohanaga et al., 2021).

f) LIS school curricula should incorporate more practical ICT-related programs and undergo regular updates (Agava & Underwood, 2020; Subaveerapandiyam et al., 2022).

g) University management should provide financial assistance for training and retraining in ICT skills to improve job performance and library services (Oyovwe-Tinoye et al., 2021).

h) University librarians should establish policies to continuously assess training needs in ICT skills to ensure quality job performance (Oyovwe-Tinoye et al., 2021).

i) LIS professionals should actively participate in training workshops and opportunities to enhance ICT proficiency (Ahmed & Rasheed, 2020).

4.2.6 Future trends

Once merely regarded as repositories of books, libraries have undergone a profound transformation in the wake of technological advancements and the widespread adoption of ICT. Today, libraries are not just physical spaces but dynamic hubs of knowledge dissemination accessible globally. Despite numerous challenges, dedicated LIS professionals work tirelessly to ensure the round-the-clock availability of library services.

The integration of various ICT applications marks the evolving landscape of libraries, the changing perceptions of users, the emergence of new disciplines, and the need to uphold professional values amidst stakeholder demands. Consequently, there is a growing imperative to equip LIS professionals with updated ICT skills to remain relevant and sustainable in the digital age.

Recent studies reveal that while librarians possess basic computer skills and moderate proficiency in specific library software and collaborative tools, these competencies often need to meet the demands of today's tech-savvy users. Moreover, the advent of AI has sparked debates on academic integrity, even as AI-driven technologies such as robotics, security systems, drones, expert systems, big data analytics, augmented reality, virtual reality, and blockchain find applications in enhancing library operations.

However, despite the potential benefits, such technologies still need to be made available in libraries of developing countries due to various constraints. Furthermore, technology is increasingly relied upon to safeguard library resources and services against natural and man-made threats.

Acknowledging that learning is a continuous process, LIS professionals must actively engage in professional development initiatives such as seminars, conferences, workshops, and training programs. By staying abreast of emerging technologies, librarians can adapt to evolving user expectations and expand the scope of library services effectively.

5. Conclusion

Proficiency in ICT among LIS professionals plays a pivotal role in implementing technological advancements for the optimal functioning of libraries. It is imperative for LIS professionals to continually enhance their expertise to utilize ICT applications tailored for library settings effectively. In contemporary times, meeting societal expectations necessitates more than just basic technical or digital literacy skills. Engaging in the LIS profession demands an exploration of the evolving landscape of skills and competencies among professionals. Hence, this study employs a systematic literature review (SLR) methodology that follows PRISMA guidelines. Three prominent databases (Web of Science, Scopus, ProQuest LISA) and a personal repository were utilized to identify relevant articles. Out of 2119 initially retrieved articles, only twenty-one underwent comprehensive scrutiny.

The analysis reveals that most articles (19 out of 21) focused on ICT skills and competencies from a quantitative research perspective. Notably, contributions from Nigeria and Pakistan and the

Journal Library Philosophy and Practice were most prevalent. While LIS professionals demonstrate proficiency in basic computer and digital literacy skills, their expertise in advanced technological domains remains moderate. This underscores the necessity for acquiring competencies in emerging technologies. Professional development avenues such as conferences, seminars, and workshops serve as primary knowledge and skill acquisition channels. However, budget constraints and limited training opportunities hinder PDP participation. Additional obstacles include a scarcity of resource persons, inadequate infrastructure, lack of personal interest, and time constraints.

The pivotal role of skilled human resources in facilitating the adoption of emerging technologies within libraries cannot be overstated. Hence, the authors advocate for mandatory and regular training initiatives, facilitated either by institutions or professional associations, to nurture ICT-capable human resources. Recommendations extend to infrastructure development, formulation of written policies, curriculum updates in LIS schools, and fostering a proactive staff attitude towards ICT integration. Furthermore, fostering a collaborative team spirit can bolster the organizational image, with knowledgeable and skilled staff driving dynamic progress. It is incumbent upon all stakeholders, whether directly or indirectly involved in enhancing LIS professional skills and competencies, to prioritize sustainable and effective library operations.

This study is based on selecting twenty-one articles from three databases using an advanced search strategy from 2020 to the present. The researchers advocate for further investigations encompassing diverse databases, extended durations, varied search methodologies, and specific subject domains such as ILMS, Information Retrieval, and emerging collaborative technologies.

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Appendix-I

SN	Author(s)	Country	Journal's Name	Sampling Technique	Sample size	Administration
1	Nagappa & K. T. (2020)	India	Library Philosophy and Practice		n=72	Email GForm
2	Abbas & Siddique (2020)	Pakistan	Library Philosophy and Practice	census	n=206	Post & email
3	Khan & Bhatti (2020)	Pakistan	Library Philosophy and Practice		n=212	
4	Agava & Underwood (2020)	Kenya	Library Management	census	n=10	
5	Ahmed & Sheikh (2020)	Pakistan	Journal of Librarianship and Information Science	systamatic random sampling	n=168	self-administration, post, email, social media
6	Ahmed & Rasheed (2020)	Pakistan	Digital Library Perspectives		n=255	Gform link shared to email, WhatsApp, Facebook
7	Hussain & Nayab (2021)	Pakistan	Library Philosophy and Practice		n=35	post and email
8	Oyovwe-Tinoye et al. (2021)	Nigeria	Information Development	purposive	n=233	

9	Munawar et al. (2021)	Pakistan	Library Philosophy and Practice		n=71	self-administrated
10	Okwu & Nsirim (2021)	Nigeria	Library Philosophy and Practice	census	n=55	self-administrate
11	Idhalama et al. (2021)	Nigeria	Information Development		n=109	GForm link shared in NLA platform
12	Hussain & Parveen (2021)	Pakistan	Library Philosophy and Practice	census	n=119	
13	Ohanaga et al. (2021)	Nigeria	Global Scientific		n=155	
14	Akintonde & Awujoola (2022)	Nigeria	Library Philosophy and Practice	total enumerated method	n=262	
15	Subaveerapandiyan et al. (2022)	Africa	Global Knowledge Memory and Communication	random sampling	n=102	GForm link shared to email and LinkedIn
16	Moruwawon & Kumar (2022)	Nigeria	Library Philosophy and Practice	purposive	n=376	
17	Tran (2023)	Viet Nam	Library Management		n=243	self-administration
18	Emezie, et al. (2023)	Nigeria	Digital Library Perspectives		n=287	
19	Borbely & Takacs (2023)	Hungary	Performance Measurement and Metrics	stratified sampling	n=1868	self-administration
20	Ntuboderia et al.(2023)	Nigeria	Library Philosophy and Practice	purposive	n=46	
21	Pandey & Madhusudhan (2023)	Nepal	LIS Today		n=5	Self-administration

NB: 1) The targeted population of the study was LIS professionals.

2) The method was quantitative except for # 3 (Mixed method) and for # 4(Qualitative method).

3) The instrument was questionnaire except for # 3 (Questionnaire and Interview) and for #4 (Interview).