Bridging the Gap: Assessing Web 2.0 Technology Adoption in Libraries Through Systematic Review

Parbati Pandey
Research Scholar, DLIS, University of Delhi
Assistant Professor, Central Department of Library and Information Science,
Tribhuvan University, Nepal
Email: ppandey@libinfosci.du.ac.in
ORCID: https://orcid.org/0009-0004-3412-0526

Margam Madhusudhan
Professor
Department of Library and Information Science
University of Delhi
Email: mmadhusudhan@libinfosci.du.ac.in
ORCID: https://orcid.org/0000-0002-1174-2099

Abstract

The evolution of technology and the internet has led to the development of numerous effective web tools that cater to different areas, including library science. The adoption of Web 2.0 tools and technologies has shown significant benefits, and this systematic review study aims to identify a comprehensive overview of the studied articles in a brief descriptive and thematic-based manner. The PRISMA-20 guidelines framework was used to select the relevant literature. Among the 314 retrieved literature, only 29 articles were selected for deep study based on the inclusive criteria. The study found that most librarians perceive Web 2.0 tools and technologies positively and have been using them for communication, promotion, and services. Significant impact factors were found in adopting Web 2.0 technology. However, they face several challenges, such as regular training, budget, electricity, poor bandwidth, and written policies, strategies, regulations, and mandate tools. To address these challenges, it is crucial to focus on influential factors such as training, staff attitude, managerial support, policies, privacy, and data security. The latest Web 2.0 tools have the potential to become a dynamic learning platform for all library stakeholders. By adopting these tools, librarians can cater to the increasing demand for Web 2.0 tools by library users.

Keywords**:** Web 2.0, Library 2.0, Libraries, LIS Professionals, Library Services, Systematic Review, PRISMA**.**

Introduction

The rapid evolution of technology has necessitated a re-evaluation of the traditional roles of librarians. Presently, libraries are endowed with a plethora of technological innovations, encompassing prominent elements such as "big data, QR codes, augmented reality (AR), virtual reality (VR), blockchain technology, artificial intelligence (AI), cloud computing, and various iterations of web technologies (Web 1.0, Web 2.0, and Web 3.0)", as articulated by Akwang (2021). Notably, academic libraries on a global scale have successfully integrated "Web 2.0 tools, effecting a transformative impact on the library environment", as evidenced by the works of Williams (2028) and Chiparusha et al. (2022).

Web 2.0 technology emerges as a potent tool for diverse applications, ranging from learning and information retrieval to entertainment. It facilitates "dynamic two-way social interactions between library staff and users, fostering connectivity and collaboration irrespective of geographical constraints", as highlighted by Ajeemsha and Madhusudhan (2019). Akwang (2021) reinforces this perspective, characterizing Web 2.0 as the "wisdom web, social web, read and write web, and participative web, harnessing the interactive and collaborative features of Web 1.0". This evolution, noted by Murugesan (2007), empowers users to contribute content and engage freely.

The extensive features of Web 2.0 have the potential to permeate and reshape the service quality paradigm, revolutionizing the roles and functions of libraries. Encompassing an array of tools such as social bookmarking, RSS feeds, Facebook, wikis, multimedia sharing, Mashaps, Flickr, Vodcasts, LinkedIn, MySpace, Twitter, YouTube FAQs, Podcasts, blogs, advanced portals, commentary and comments, personalization, streaming media, "reviews and user-driven ratings, personalized alerts, web services and enhancement, data mining, instant messaging, folksonomies, social networking sites, open access, and open content, Web 2.0 represents a dynamic force", as elucidated by Ajeemsha and Madhusudhan (2012; 2019).

This transformative impact is further underscored by Mukhopadhaya (2012), who highlights notable "Web 2.0 tools like blogs, Digg, Flickr, instant messaging, podcasts, RSS feeds, wikis, LibraryThing, PaperBackSwap, Second Life, and Technorati". Additionally, the pervasive influence of social media extends its reach into various sectors, with academic libraries being no exception. Social media emerges as a formidable tool for integration and information sharing,

with platforms such as Facebook, Twitter, LinkedIn, instant messaging, and YouTube emerging as popular choices, as attested by Fasae (2020) and Mensah &Onyancha (2021).

Purpose of the Study

With the explosion of ICT with different names and features, every sector is trying to adopt in their premises. Among them, collaborative tools, i.e. Web 2.0 tools, impact very positively to provide better services for the users in all types of libraries. Now, another version of Web 2.0 (i.e. Web 3.0) has become a hot topic, and libraries have gotten competitions to accept them. Infrastructure and personnel's positive attitudes are much influenced by adopting technology. Therefore, developed countries can adopt them ultimately. However, in the case of developing countries, it is challenging to apply them no matter the fact that there are so many benefits. Hence, it is essential to understand the level of adoption of Web 2.0 tools and its associated factors in libraries.

Research Questions

1) What are the ways in which libraries incorporate Web 2.0 technologies, and what are their favoured applications tailored for specific purposes?
2) What factors significantly influence the integration of Web 2.0 tools and technologies within library settings?
3) What obstacles do librarians encounter when embracing Web 2.0 in library environments?
4) What potential developments can be anticipated in utilizing Web 2.0 technology?

Research Methodology

This research adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA-20) guidelines framework, which comprises four key stages: "identification, screening, eligibility, and inclusion of studies." These steps are employed to choose pertinent literature related to deep learning systematically.

Planning stage

In this phase, we gathered over 20 articles pertaining to collaborative tools by employing search keywords such as "Web 2.0 AND academic libraries," "Web 2.0 AND libraries," "Web 2.0 AND university libraries," and "Libraries AND Web 2.0." Subsequently, we narrowed the selection to 15 articles cited five or more times. The abstracts, keywords, and authors' specified terms were

scrutinized, and common keywords were identified to formulate a search strategy for database queries. Concurrently, inclusion criteria (IC) and exclusion criteria (EC) were developed to guide the selection process for the articles retrieved in this study.

Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria (IC)		**Exclusion Criteria (EC)**	
IC1	Written in the English language	EC1	If not available in full-text
IC2	Peer-reviewed research articles	EC2	If not having DOI no.
IC3	The source should be the Journal	EC3	If not, have an abstract
IC4	Paper published under "Library and Information Science Area."	EC4	If literature under book chapter, conference and proceedings
IC5	The published period is from 2015-2023.		

Conducting stage

In this phase, refining the search strategy involved collaboration with the Professor and co-author of this study. After incorporating necessary corrections, the chosen strategy was implemented on the Scopus database. The rationale behind selecting Scopus lies in its extensive multidisciplinary, peer-reviewed literature collection. Although Scopus indexes a wide range of quality library science content, only peer-reviewed journal articles were considered for this study.

The search query utilized advanced techniques with Boolean operators, focusing on the "TITLE-ABS-KEY" (title, abstract, and keyword) field. The search parameters included source type (journal), language (English), document type (original full text), and publication date range from 2015 to 2023. The search yielded 282 articles, and this process was iteratively applied with the specified filters.

The timeframe for the search, from 2015 to 2023, was chosen due to its increased productivity compared to the data available in the Scopus database (as illustrated in Fig. 1). All 282 identified articles were meticulously tracked, exported, and saved as CSV files on the 15th of August, 2023, for subsequent thematic review. Additionally, 15 more articles, previously downloaded during the planning stage, were incorporated into the collection. Seventeen additional articles meeting the inclusion criteria were sourced from personal devices, resulting in a total of 314 articles poised for review in accordance with PRISMA guidelines.

Search strategy: Web 2.0 OR Library 2.0 AND Librar* OR University library*

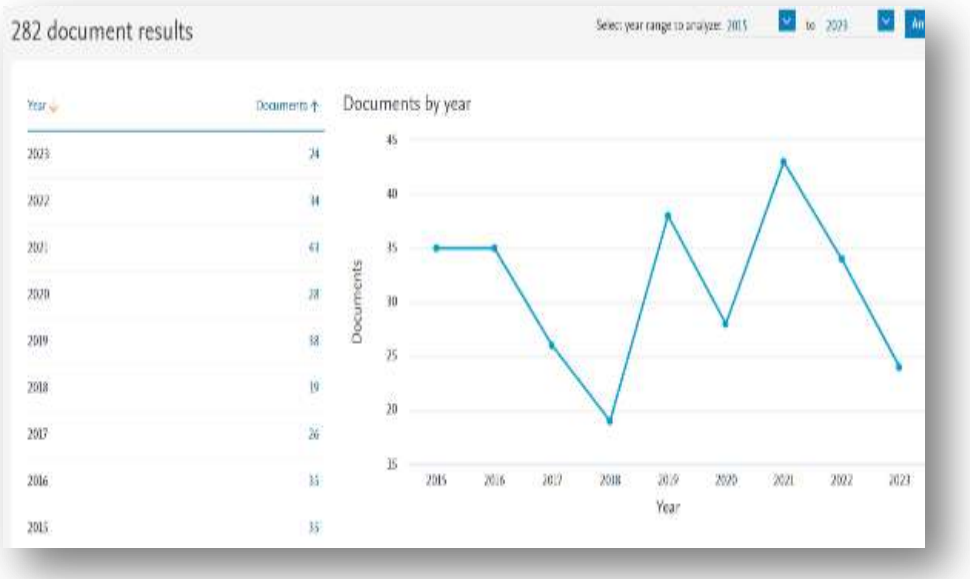

Fig. 1: Documents by Year Retrieved from Scopus

(Source: Scopus Database)

Synthesis and Screening Stage

After eliminating duplicates (n=3), a total of 311 articles remained. Subsequently, 215 unrelated articles were excluded upon meticulous examination of their abstracts. This screening process led to 96 articles that met the in-depth, full-text analysis criteria.

The authors identified and removed five inaccessible articles after obtaining the full-text versions. Additionally, 62 articles were skipped as they needed to align with the specific objectives of this systematic review theme. The remaining 29 articles were deemed suitable for inclusion in the review. The authors employed descriptive and thematic approaches to present and synthesize the findings. MS Excel was utilized for coding, extracting information, and

articulating the themes of each article. After completing the four components of the PRISMA process, relevant themes were derived, as detailed in Appendix I, Table 2.

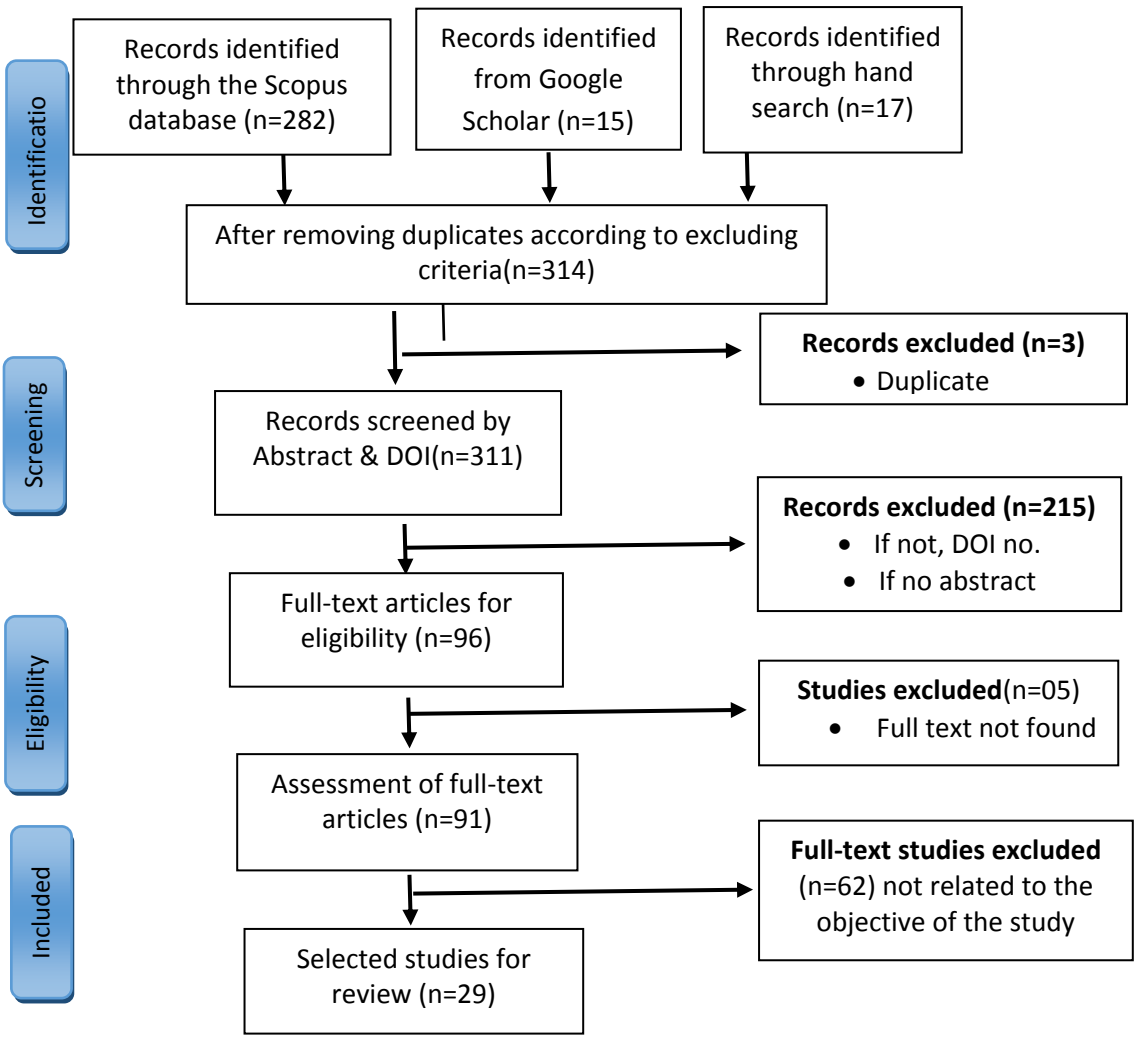

Fig. -2: PRISMA-20 Guidelines Framework for Selection of Papers

n*=number of articles

Data Analysis and Interpretation

To conduct a rigorous analysis, the researchers devised an extensive search strategy to retrieve essential literature. The primary sources for this literature search were the Scopus database and Google Scholar. Following the PRISMA guidelines for analysis, a combination of database and manual searches identified an initial pool of 314 articles. However, after careful consideration, only 29 articles were chosen for this study's final descriptive and thematic review.

Descriptive Review of Literature

This investigation encompasses a compilation of 29 research articles delineated in Table 2. Among these, 14 articles were collaboratively authored and published, while eight articles were the sole work of a single author, and two individuals co-authored the remaining seven. Predominantly (96.55%), the studies were conducted within academic libraries. Notably, the peak number of published studies occurred in 2016 and 2021 (n=6), with no publications identified for 2022. India emerged as the frontrunner in contributing studies (41.38%), trailed by Pakistan (10.34%), Nigeria (10.34%), Kuwait (6.9%), and Iran (6.9%). The residual studies (24.14%) comprised one research article from the Asia region, five from other countries, and one collaborative effort.

An examination of the methodology sections across the 29 articles revealed that 62.07% employed quantitative technology, while content analysis techniques were applied in 27.8% of the studies. Qualitative techniques were featured in only 6.9% of the studies, while the multi-method approach was utilized in 3.45%. Regarding sampling techniques, 72.41% of the studies did not specify the method, while 10.34% employed purposive sampling, 6.9% used ranked methods, 6.9% employed random sampling, and 3.45% opted for multistage sampling techniques. Data collection tools were predominantly questionnaires (62.06%), followed by checklists in 13.8% of the studies, and interviews in 6.9%. Remarkably, 17.24% of the studies should have disclosed the tools used for data collection. The sample sizes exhibited considerable variation, ranging from a maximum of n = 1022 to a minimum of n = 6 among these 29 articles.

Thematic Review of Literature

The 29 chosen studies undergo thematic review and are categorically organized into seven sections corresponding to the research questions (refer to Section 2.1).

Adoption and Familiarity with Web 2.0 Tools

In the era of rapid technological advancements, many applications continue to emerge, transforming the digital landscape. The pervasive nature of these tools has permeated global boundaries, prompting users to explore their multifaceted benefits. Such tools, often categorized as cutting-edge technologies, evolve alongside societal shifts, with Web 2.0 applications standing out as collaborative platforms. These encompass Wikis, Blogs, RSS Feeds, Podcasts/Vodcasts, Social Bookmarking Sites, Social Networking Sites (such as Facebook, Twitter, and LinkedIn),

Academic Social Networking Sites (e.g., ResearchGate, Academia), Social Media Tools (WhatsApp, Viber, WeChat), and Audio/Video Sharing/Webcasting platforms. Each tool boasts dynamic and diverse features that significantly enhance library resources and services.

The successful adoption of any application hinges on awareness. For libraries to integrate Web 2.0 effectively, Library and Information Science (LIS) staff must be well-versed in these tools' inherent advantages and drawbacks. Ranjan & Bhatt (2021), EbrahimzadehPirshahid et al. (2016), Ur Rahman et al. (2016), Singh (2018), Hussain & Jan (2018), Ranjan (2017), Santosh (2017), Rahoo et al. (2018), Awele&Foluke (2019) conducted a study to know the awareness, adoption, and use of Web 2.0 technologies in academic libraries. Basic foundation, and many factors influence the awareness and adoption of any technology. Therefore, the developed countries are fast-forward regarding this. However, in underdeveloped and developing countries, the scenario is different. The result of Ur Rahman et al. (2016), Ranjan (2017), and Santosh (2017) shows that LIS professionals have a fair level of awareness and are familiar with Web 2.0 tools, technologies and services. Youngbloods can learn and adopt new things and technology in any field. It is also found in the library field that young professionals are genuinely interested in learning new things and have an awareness level towards web 2.0 tools and technologies that is comparatively higher than others found by Hussain & Jan (2018) and Singh (2018). It is not predicted that all the librarians have a low level of awareness. EbrahimzadehPirshahid et al. (2016) found that librarians were more familiar with Web 2.0.

Diverse Applications of Web 2.0 Technologies

Web 2.0 collaborative tools encompass various purposes, contributing multifaceted dimensions to the library's portfolio. A comprehensive analysis of 29 referenced articles reveals that libraries and librarians widely integrate Web 2.0 tools, particularly social media and networking platforms, for various communication purposes, connecting with users, peers, and associates (EbrahimzadehPirshahid et al., 2016; Gmiterek, 2023). Web 2.0 tools support and guide authors, scholars, and students across diverse modalities (Singh, 2018; Awele&Foluke, 2019; Islam & Habiba, 2015; Oyovwe-Tinuouye et al., 2020). Furthermore, these tools find application in marketing library products, sources, and services, ensuring the dissemination of timely and relevant information to users (Hussain &Jan, 2018; Rahoo et al., 2018; Gmiterek, 2023; Islam & Habiba, 2015).

Libraries, librarians, users, and seekers benefit from Web 2.0 technologies in various other capacities, such as enhancing reference services (Ranjan & Bhatt, 2021; Oyovwe-Tinuouye et al., 2020), facilitating the exchange of information and knowledge (Ranjan & Bhatt, 2021; Baroumi, 2017), staying current with updates (EbrahimzadehPirshahid et al., 2016; Singh, 2018), disseminating news and events (Islam & Habiba, 2015), making announcements (Ranjan & Bhatt, 2021; Oyovwe-Tinuouye et al., 2020), conducting training sessions, blogging, managing Online Public Access Catalogs (OPAC), tracking new arrivals (Rajan& Bhatt, 2021), collaborating with colleagues, fostering curiosity and fun (EbrahimzadehPirshahid et al., 2016), exploring valuable and up-to-date information, socializing (Singh, 2018), providing entertainment and interaction, enhancing class engagement (Awele&Foluke, 2019), supporting self-inquiry, creating custom menus, delivering real-time services (Gan, 2016), facilitating video conferencing, advertising, contributing to library collection management (Islam & Habiba, 2015), facilitating orientation, and enabling instant messaging for extension and outreach services, among others (Oyovwe-Tinuouye et al., 2020).

Web 2.0 Tools and Their Applications in Library Services

The market has experienced a surge in the availability of robust tools and technologies associated with Web 2.0 for both personal and official purposes. However, the awareness and utilization of these applications among librarians, particularly in developing countries, exhibit variations. According to Ranjan and Bhatt's (2021) study, librarians demonstrated familiarity with well-established tools such as Blogs, wikis, Facebook, Twitter, and Instant Messaging. Nevertheless, lesser-known applications like Podcasting, RSS feeds, Linkedin, LibraryThing, Flickr, and MySpace should have been noticed.

Further investigations into the use of Web 2.0 applications in library settings have uncovered diverse findings. Noteworthy tools identified in various studies include Blogs, Wikis, Facebook, Twitter, Social bookmarking, tagging, social networking services, Opac 2.0, Mashups, Networking services, Google Docs, Instant Messaging, Vodcast, YouTube, Skype, email/group email, Podcast, RSS, Social networking sites, Instant messaging, WeChat, and WhatsApp. Interestingly, while some studies highlight the indispensability of applications like Blogs, Facebook, Skype, and LinkedIn, others suggest that these tools are less utilized than alternatives

mentioned in the literature. For instance, despite Facebook's long-standing existence, Gmiterek (2023) discovered that its adoption in the library field was less widespread than expected.

Web 2.0 tools empower users to create, collaborate, communicate, and share activities globally, a functionality restricted in the earlier Web 1.0 era. Among the diverse array of Web 2.0 tools, Facebook emerges as a versatile platform employed for marketing and promoting library resources and services, entertainment and interaction, user communication, sharing news and events, video conferencing, and advertising library products and resources. Similarly, Twitter is a popular tool for disseminating concise and genuine messages, used for marketing and promotion, sharing news and announcements, providing information about library collections and services, and sharing information and knowledge.

Wikis find applications in marketing, promotion, and educational purposes, while RSS, LinkedIn, YouTube, and Email groups have been noted for their varied utility. Blogs, serving both marketing and promotion and educational functions, highlight the multifaceted nature of these tools. Additionally, WeChat is employed for self-inquiry custom menus real-time services. YouTube, Email groups, Podcasts, LinkedIn, and WhatsApp are recognized for their distinct roles in library services and outreach.

Integrating Web 2.0 Tools

Collaboration tools offer remarkable features that can be seamlessly incorporated into various web platforms. Most websites have already embraced these tools, with their integration and utilization forming a pivotal aspect of diverse quality assessment criteria. Tall &Oladapo (2016) observed that South African universities had adopted a greater number of Web 2.0 tools compared to their Nigerian counterparts, assessing ten ranked universities from both countries. In another study, Moradi et al. (2017) explored the usage of Web 2.0 technologies in the top 100 global universities, revealing a below-average incorporation of such applications on their websites.

The application of Web 2.0 technology in state university libraries' websites is evident in India, although the same cannot be said for Indian Institutes of Management, as revealed by Ganwar& Verma (2019). Haridasan Firdaus (2021) delved into the websites of university libraries in India, highlighting a prevalent need for more Web 2.0 tools and social media services. Balaji et al. (2019) conducted a study indicating that over two-thirds of Asian university libraries have

successfully integrated one or more Web 2.0 applications, including platforms such as Facebook, RSS, Twitter, YouTube, and others, into their websites.

Factors Influencing the Adoption of Web 2.0 Tools and Technologies

Some factors directly or indirectly influence librarians to implement in libraries. The following key factors significantly influence the adoption landscape:

(i) Training Impact: Effective training is a key driver for librarians to practically apply updated skills and knowledge. Studies by Santosh (2017) reveal that training significantly influences staff implementation. Ajeemsha and Madhusudhan (2019) and Bajpai and Madhusudhan (2020) identified more confidence and training as barriers to the librarian's technology implementation. As AI-Kharousi et al. (2016) noted, internal factors and insufficient training also affect the incorporation of Web 2.0 tools. Library and Information Science (LIS) professionals, recognizing the potential of Web 2.0 tools, believe in their efficacy for disseminating information (Pirsjahid et al., 2016), while Islam & Habiba (2016) found positive librarian attitudes toward social media with a strategic adoption plan.

(ii) Ease of Use and Utility: Technology's perceived ease of use and usefulness significantly impact librarians' attitudes. Baroumi (2017) emphasizes that technology should enhance the library perspective and be easily learnable for staff and users. Librarians are deterred from adopting technology if it is deemed challenging to manage or needs more perceived utility.

(iii) Personal Motivation/Self-Motivation: Personal motivation and interest play a crucial role in accepting technology. AI-Kharousi et al. (2016) identified low motivation among directors and staff as a challenge to adopting Web 2.0 technology. Santosh (2017) highlighted personal interest as a motivational factor impacting technology implementation in library environments.

(iv) Stable Management: Organizational stability, characterized by long tenures and a well-defined chain of command, facilitates strategic planning for technology adoption. “Constant changes in the management structure affect the implementation of Web 2.0 tools” (AI-Kharousi et al., 2016).

(v) Policy and Regulations: Most libraries could not adopt Web tools properly due to the need for well-defined policies and regulations. All the web 2.0 tools and their embedded features may only benefit some. Cyberlaw also may be active in some issues. AI- Kharousi (2016) defined policy and regulations as external factors that affect the adoption of web tools. Oyovwe-

Tinuouye et al. (2020) found a need for more policies on the use of WhatsApp in university libraries. Mensah &Onyancha (2021) found that librarians must formulate strategic plans to adopt Web technology.

(vi) Privacy and Security: The most significant problem is the security of institutional and individual data uploaded in the Web tools, which are stored in a cloud server. If the institute adopts, such applications should be confident and guaranteed to keep such data safe from hackers and misusers. Islam & Habiba (2015) stressed that the losing system regarding privacy and security impacted the adoption of web tools due to fear of lost data. The fear of misusing personal information (Singh, 2018) significantly affects adopting technology. If libraries declare security and privacy, they increase the use of the applications.

(vii) Internet and Accessibility, Internet Filtering: Internet access, especially high-speed and freely accessible in required areas, significantly impacts the adoption of Web 2.0 tools. As observed with banned applications in certain regions, Internet filtering also affects adoption (Pirshahid et al., 2016).

(viii) Electricity: The availability of electricity is a critical factor in adopting technology. Electric failure, as found by various studies (Islam & Habiba, 2025; Ranjan & Bhatt, 2021; Awele&Foluke, 2019; Oyovwe-Tinouye et al., 2020), is a hindrance in adopting Web technology, particularly in developing countries.

(ix) Adequate Human Resources: Skilled and knowledgeable staff are essential for successfully adopting technology. Islam & Habiba (2015) and Mensah &Onyancha (2021) identified education, training, and dedicated staff as crucial factors. Age, knowledge, and skills also impact the adoption of Web 2.0 tools.

(x) Digital Divide: The users' digital literacy plays a significant role in implementing library technology. If the users do not have the knowledge and skills to use the services provided by libraries using Web 2.0 technology, the libraries cannot succeed in their planning. Therefore, Bajpai & Madhusudhan (2020) highlighted to empower the users too.

(xi) Help and Support: Implementing library technology is a collaborative effort requiring various stakeholders' assistance and support. It is crucial to work together to ensure success. Institutional support, in the form of incentives, technological assistance (Santosh, 2017), and cooperation from higher authorities (Rahman et al., 2016), is essential to motivate the library and

information science staff. In developing countries, there is a need for collaborative technical support to recover from the technological staff crises.

(xii) Budget and Finance: Among the significant components like Internet, Electricity, technology, skilled human resources, place, and clients, budget impacts all of these. Without stable, sufficient finances, all the activities become frizzed. Limited budget (Akwang, 2020) impact of applying new web technology in the library.

(xiii) Staff Attitude and Perception: Many reasons might radically change people's attitudes and perceptions that motivate them to adopt technology. Akwang (2021) found the factor "positive perception" that influenced the adoption of web tools. Librarians' perception and knowledge of the use of WhatsApp for enhancing services in university libraries was found by (Oyovwe-Tinuouye et al., 2020). Some people cannot accept radical change in their working environment and do not take any risks when adopting new technology.

Overcoming Hurdles in the Integration of Web 2.0 Tools

Integrating a variety of Web 2.0 tools and technologies offers libraries significant prospects for enhancing the efficient delivery of library resources and services. However, implementing such technology faces inherent challenges, particularly at the grassroots level. This challenge is even more pronounced in developing and underdeveloped nations. The imperative prerequisites for successful adoption encompass well-established infrastructure, proficient human capital, high-speed internet connectivity, consistent electricity supply, financial resources, accessibility to digital devices, and the formulation of well-crafted policies. These elements constitute the foundation for effectively incorporating web applications in library settings (Figure 3).

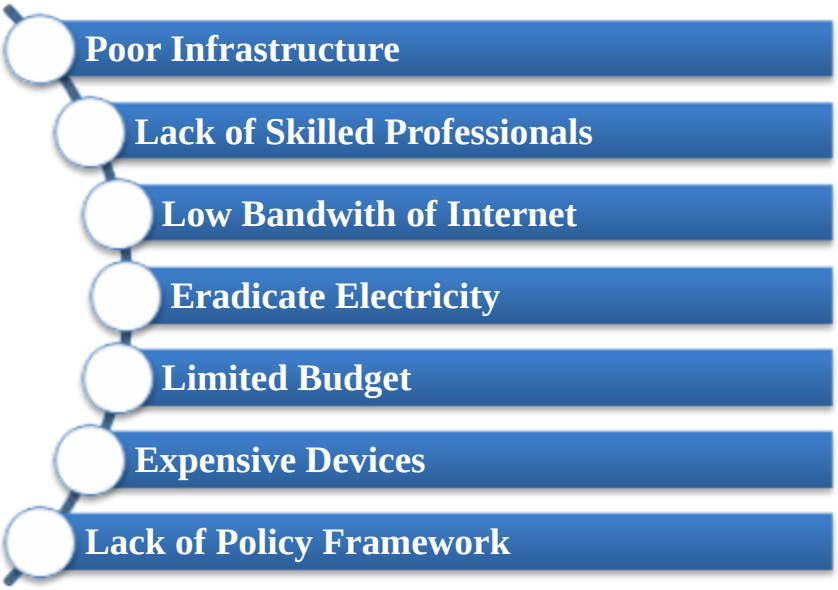

Fig. 3: Challenges to implementing Web 2.0 in libraries

Fig. 3 reveals that the existing body of literature underscores myriad challenges hindering the successful implementation of Web 2.0 tools and technologies in libraries. Key impediments include the absence of accessible and high-speed Internet, as noted by Santosh (2017), Awele and Foluke (2019), Ranjan and Bhatt (2021), Islam and Habiba (2015), EbrahimzadehPirshahid et al. (2016), Ur Rahman et al. (2016), and Oyovwe-Tinuouye et al. (2020). Additionally, insufficient professional development programs encompassing training initiatives have been identified as a significant barrier (Santosh, 2017; Akwang, 2020; EbrahimzadehPirshahid et al., 2016; Ur Rahman et al., 2016).

Challenges such as unreliable electricity supply (Ranjan & Bhatt, 2021; Ur Rahman et al., 2016; Islam & Habiba, 2015; Oyovwe-Tinuouye et al., 2020), a shortage of skilled professional human resources (Ranjan & Bhatt, 2021; Islam & Habiba, 2015), absence of well-defined policies (Akwang, 2020; Oyovwe-Tinuouye et al., 2020), inadequate budget allocation (Akwang, 2020; Ur Rahman et al., 2016), lack of incentives, absence of institutional and technical support, and a scarcity of required resources have been identified as significant hurdles (Santosh, 2017).

Moreover, high-cost of technology and poor access of web tools (Akwang, 2020), non-cooperation from higher authorities (Ur Rahman et al., 2016), Internet filtering (EbrahimzadehPirshahid et al., 2016), time consuming, fear of misusing personal information

(Singh, 2018) and security and privacy (Islam & Habiba, 2015) are some of the significant issues and challenges to implement Web 2.0 tools and technologies in libraries.

Future Trends in the Application of Web 2.0 Technology

After analyzing 29 articles, it was found that most studies used questionnaires for quantitative data. The results showed that academic libraries use one or more Web 2.0 tools for communication, promotion, and services. Social media platforms were used for communication and document sharing, while reference services were provided for services. However, there were several reasons why libraries were not fully utilizing Web 2.0 tools, including the lack of policies and regulations, training, a strategic framework, dedicated staff, and infrastructure. The studies suggested that training and retraining are necessary, along with providing a written policy, regulations, and strategies framework. Libraries should recruit professionals with skills to handle Web 2.0 applications and provide support for basic infrastructure, including power backup, high-speed internet, and sufficient budget. It is also essential to ensure privacy, data security, and surveillance. A list of mandatory Web 2.0 tools applicable to all libraries should be provided, and the users' behaviour towards uploaded content should be regularly examined to make future strategic plans. The ultimate goal of libraries is to meet the users' demands and having dynamic plans can make the role of Web 2.0 in libraries more effective. The latest Web 2.0 tools and technologies can provide a collaborative platform to achieve library objectives.

Conclusion

Web 2.0 technology, having existed for an extended period, boasts features catering to individuals and institutions. The manifold advantages of these technologies contribute significantly to organizational growth. The versatility of Web 2.0 tools spans a wide range of applications, with increasing adoption trends. Noteworthy social media platforms like Facebook, Instagram, LinkedIn, Twitter, and TikTok have become instrumental for organizations in marketing themselves, serving various purposes such as communication, entertainment, and information sharing.

From a library standpoint, Web 2.0 technologies offer avenues to connect with users and deliver services in diverse ways. Libraries can use these tools to provide instant notifications, reference services, information sources, communication, promoting and marketing resources and services,

and more. Librarians' skills, attitudes, perceptions, education, and professional fields influence technology adoption. Institutional support, device availability, electricity and internet speed, users' digital literacy, attitude, budget, timing, policy and strategy, educational policy, government rules, technical support, usefulness, and ease of use significantly impact technology adoption. Librarians in developing countries have a keen interest in adopting these technologies but have faced obstacles such as institutional ignorance, financial constraints, lack of confidence, lack of technical support, and inadequate training.

This systematic literature review examines the current state of Web 2.0 technology adoption in libraries. The results show that many libraries and librarians still need to adopt many Web 2.0 tools, even though they are free and can be used for various purposes in libraries. Institutional efforts are necessary to sustain the use of ICT applications. Therefore, authorities should initiate regular training and other professional development programs for library staff. Librarians should also embrace tech-savvy behaviour. In addition, management should create policies for regulations to start the development of advanced infrastructure with high-speed internet, power backup, and adequate budgets for sustainable adoption of ICT, including Web 2.0 technology in libraries.

References

Ajeemsha, S., & Madhusudhan, M. (2012). Competencies for LIS professionals in the working environment: analysis and dimensions. *International Journal of Library and Information Studies*, *2*(4), 18–25.

Ajeemsha, S., & Madhusudhan, M. (2019). Competencies on Web 2.0 skills of LIS professionals working in central university libraries of South India: A Study. *Journal of Indian Library Association*, *55*(4), 16–24.

Al-Kharousi, R., Jabur, N. H., Bouazza, A., & Al-Harrasi, N. (2016). Factors affecting the implementation of Web 2.0 applications in Omani academic libraries. *The electronic library*, *34*(2), 332-351.

Al-Daihani, S. M., &AlAwadhi, S. A. (2015). Exploring academic libraries' use of Twitter: A content analysis. *The Electronic Library*, *33*(6), 1002-1015.

Akwang, N. E. (2021). A study of librarians' perceptions and adoption of Web 2.0 technologies in academic libraries in Akwa Ibom State, Nigeria. *The Journal of Academic Librarianship*, *47*(2), 102299.

Akporhonor, B. A., &Fasae, J. K. (2020). Use of social media by librarians in promoting library and information resources and services in academic libraries in Ekiti and Ondo States, Nigeria. *Library Philosophy & Practice (e-journal)*, p. 4093. https://digitalcommons.unl.edu/libphilprac/4093

Awele, A., & Okocha, F. (2019). Adoption of Web 2.0 applications for education by students in Nigeria. *Library Philosophy and Practice (e-journal)*, 2507, 1-37. https://digitalcommons.unl.edu/libphilprac/2507

Bajpai, V. K., & Madhusudhan, M. (2020). ICT skills in collaborative age: An assessment of library and information science professionals working in the college libraries affiliated to University of Delhi. *Pearl: A Journal of Library and Information Science*, *14*(3), 281-292.

Balaji, B. P., MS, V., BG, S., & JS, M. R. (2019). Web 2.0 use in academic libraries of top-ranked Asian universities. *The Electronic Library*, *37*(3), 528- 549.

Barhoumi, C. (2017). Analysis of technological, individual and community factors influencing the use of popular Web 2.0 tools in LIS education. *The Electronic Library*, *35*(5), 977–993.

Burhansab, P. A., Batcha, D. M. S., & Ahmad, M. (2021). Impact of Web 2.0 technologies on academic libraries: A survey on affiliated Colleges of Solapur University.*Library Philosophy and Practice (e-journal)*, p. 4587. 4587. https://digitalcommons.unl.edu/libphilprac/4587.

Chiparausha, B., Onyancha, O. B., & Ezema, I. J. (2022). Factors influencing the use of social media by academic librarians in Zimbabwe: a UTAUT model analysis. *Global Knowledge, Memory and Communication*, 2514-9342. DOI 10.1108/GKMC-09-2021-0151

EbrahimzadehPirshahid, S., Naghshineh, N., &Fahimnia, F. (2016). Knowledge and use of Web 2.0 by librarians in university libraries of East Azerbaijan, Iran. *The Electronic Library*, *34*(6), 1013–1030.

Gan, C. (2016). A survey of WeChat applications in Chinese public libraries. *Library Hi Tech*, *34*(4), 625–638. https://digitalcommons.unl.edu/libphilprac/2507

Gangwar, R., & Verma, S. (2021). Assessment of library webpages of Indian Institutes of Management (IIMs) North India: An evaluative study. *Library Philosophy and Practice (e-journal)*, 6094. https://digitalcommons.unl.edu/libphilprac/6094

Ghuloum, H. F., &Buabbas, H. (2016). The concept of librarian 2.0 in Kuwaiti academic libraries. *Information Development*, *32*(5), 1631-1638.

Gmiterek, G. (2023). Use of Facebook fan pages in Polish academic libraries (2009–2022). *The Journal of Academic Librarianship*, *49*(2), 102678.

Haridasan, S., & Firdaus, S. (2021). Application of web-based sources and services for sustainable development in university libraries. *Library Philosophy and Practice(e-journal)*, 1-16. https://digitalcommons.unl.edu/libphilprac/4878

Hussain, A., & Jan, S. U. (2018). Awareness of web 2.0 technology in the academic libraries: An Islamabad perspective. *Library Philosophy and Practice* (e-journal). http://digitalcommons.unl.edu/libphilprac/1945

Islam, M. M., & Habiba, U. (2015). Use of social media in marketing of library and information services in Bangladesh. *DESIDOC Journal of Library & Information Technology*, *35*(4), 299-303.

Mensah, M., &Onyancha, O. B. (2021). A social media strategy for academic libraries. *The Journal of Academic Librarianship*, *47*(6), 102462.

Moradi, S., Tayefeh Bagher, D., &Mirhosseini, Z. (2017). Designing a model for Web 2.0 technologies application in academic library websites. *Information and Learning Science*, *118*(11/12), 596-617.

Murugesan, S. (2007). Understanding Web 2.0. *IT professional*, *9*(4), 34-41.

Mukhopadhyay, P. (2012). Marching with mashup: application of information mashup for developing open library system. *Challenges in Library Management System, pp. 24*, 39.

Oyovwe-Tinuoye, G. O., Akpojotor, L. O., &Ijiekhuamhen, P. O. (2020). Librarians' perceptions and knowledge of the use of WhatsApp for the enhancement of library services in university libraries in South-South, Nigeria. *Library Philosophy and Practice (e-journal)*, p. 4244.https://digitalcommons.unl.edu/libphilprac/4244

Patel, S. S., & Bhatt, A. (2019). The application of Web 2.0 tools in university libraries of India. *Library Philosophy and Practice (e-journal). 2984*. https://digitalcommons.unl.edu/libphilprac/2984

Rahoo, L. A., Baladi, Z. H., Arshad, S., Nagar, M. A. K., &Rustamani, S. (2018). Use of Web 2.0 tools for marketing and promotion of library services in higher education institutes of Sindh. In *2018, IEEE 5th International Conference on Engineering Technologies and Applied Sciences (ICETAS*. IEEE.

Ranjan, J., & Bhatt, R. K. (2021). Application Of web 2.0 tools and technologies by library professionals in select libraries in Delhi: A study. *Library Philosophy and Practice (e-journal)*, 6078. https://digitalcommons.unl.edu/libphilprac/6078

Santosh, S. (2017). Awareness, use and attitude of library professionals towards Web 2.0 applications in central university libraries in India. *Annals of Library and Information Studies (ALIS)*, *64*(3), 155–164.

Santosh, S. (2017). Adoption of Web 2.0 applications in academic libraries in India. *DESIDOC Journal of Library & Information Technology*, *37*(3), 192–198. DOI: 10.14429/djlit.37.3.10918

Singh, M. (2018). Adoption of Web 2.0 tools in higher education in India: a study. *Global Knowledge, Memory and Communication*, *67*(4/5), 297–315.

Tella, A., &Oladapo, O. J. (2016). A comparative analysis of available features and Web 2.0 tools on selected Nigerian and South African university library websites. *The Electronic Library*, *34*(3), 504-521.

Rai, P., & Verma, S. (2021). Analysis of central universities library webpages in Uttar Pradesh: An evaluative study. *Library Philosophy and Practice(e-journal), p. 5580.* https://digitalcommons.unl.edu/libphilprac/5580

Ur Rahman, A., Idrees, H., & Khan, A. (2016). Prerequisite and awareness status of Web 2.0 applications in university libraries of Khyber Pakhtunkhwa. *Library Hi Tech News*, *33*(8), 5–7.

Williams, M. L., Dhoest, A., &Saunderson, I. (2019). Social media, diffusion of innovations, morale and digital inequality: A case study at the University of Limpopo Libraries, South Africa. *Library Hi Tech*, *37*(3), 480–495.

Appendix-I

Table 2

Selected Papers for Study

Sl.No.	Author(s)	Country	Type of Library	Method	Population	Sampling Technique	Instruments	Sample size
1.	Islam &Habiaba (2015)	Bangladesh	Academic Libraries	Quantitative technique	Library Professionals	____	Questionnaire	n=55
2.	AI-Daihani& AI Awadhi (2015)	Kuwait	Academic Libraries	Content analysis	Libraries' Twitter	____	____	n=17
3.	Gan (2016)	China	Public Libraries	Content analysis	Public libraries' WeChat account	____	____	n=46
4.	AI-Kharousi et al. (2016)	Oman	Academic Libraries	Qualitative technique	Directors and LIS staff	____	Semi-structured interview	n=29
5.	Tella&Oladapo (2016)	Nigeria and South Africa	Academic Libraries	Content analysis	Universities' Website	Ranked method	__	n=60
6.	Ghuloum&Bubbas(2016)	Kuwait	Academic Libraries	Qualitative technique	Librarians	____	Face to Face interview	n=20
7.	EbrahimzadehPirshahid et al. (2016)	Iran	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=35
8.	Ur Rahman et al. (2016)	Pakistan	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=73
9.	Santosh (2017)	India	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=57
10.	Baroumi (2017)	Saudi Arabia	Academic Libraries	Quantitative technique	LIS educators	Random method	Questionnaire	n=108
11.	Santosh (2017)	India	Academic Libraries	Quantitative technique	Librarians	Purposive sampling	Questionnaire	n=150
12.	Moradi et al. (2017).	Iran	Academic Libraries	Content analysis	Universities' Websites	Ranked (Webometrics)	Checklist	n=100
13.	Singh (2018)	India	Academic Libraries	Quantitative technique	Students, research scholars and LIS professionals	____	Questionnaire	n=100
14.	Rahoo et al. (2018).	Pakistan	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=87
15.	Hussain & Jan (2018)	Pakistan	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=72
16.	Awele&Foluke (2019)	Nigeria	Academic Libraries	Quantitative technique	Users	Purposive sampling	Questionnaire	n=380
17.	Balaji et al. (2019).	Asia	Academic Libraries	Multi-Method approach	University Libraries' Websites	____	____	n=75
18.	Patel & Bhatt (2019)	India	Academic Libraries	Content analysis	University Libraries' Websites	____	____	n=34
19.	Ajeemsha& Madhusudhan (2019)	India	Academic Libraries	Quantitative technique	Library staffs	____	Questionnaire	n=130
20.	Burhansab et al. (2020)	India	Academic Libraries	Quantitative technique	Library Users	Random method	Questionnaire	n=1022
21.	Bajpai &Madhusudhan(2020)	India	Academic Libraries	Quantitative technique	Library staff	____	Questionnaire	n=171

22.	Oyovwe-Tinuoye (2020)	Nigeria	Academic Libraries	Quantitative technique	Librarians	Purposive sampling	Questionnaire	n=72
23.	Akwang (2021)	Nigeria	Academic Library	Quantitative technique	Librarians	____	Questionnaire	n=60
24.	Rai & Verma (2021)	India	Academic Library	Content analysis	Central Universities' Website, UP	____	Checklist	n=06
25.	Ranjan & Bhatt (2021)	India	Academic Libraries	Quantitative technique	Librarians	____	Questionnaire	n=41
26.	Haridasan& Firdaus (2021)	India	Academic Libraries	Content analysis	University Libraries Website	____	Checklist	n=42
27.	Gangwar& Verma (2021)	India	Academic Libraries	Content analysis	IIMS's library websites	____	Checklist	n=06
28.	Mensah &Onyancha (2021)	Ghana	Academic Libraries	Quantitative technique	Librarians	Multistage sampling	Questionnaire	n=94
29.	Gmiterek (2023)	India	Academic Libraries	Quantitative technique	University Libraries	____	Questionnaire	n=59

Note: n*=number of samples.