Implementing Technology to Improve Creative Academic Library Services in 21st-Century Libraries in India

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***Abstract*—To satisfy user expectations and resource needs, academic libraries are realizing more and more how important it is to integrate innovative technologies. Effective use of technology is essential to educational libraries' success. A thorough analysis finds new trends that university libraries are using to satisfy present demands. In the twenty-first century, libraries are becoming dynamic establishments that meet the changing demands of society. These consist of data literacy, digitization, and the incorporation of augmented and virtual reality technologies. Additionally, libraries are becoming community hubs for educational programs like seminars and lectures. Libraries are helping people navigate the immense ocean of information, and data literacy along with knowledge skills is essential. Services driven by AI are improving client experiences and expediting procedures. With libraries implementing eco-friendly architectural designs & community engagement tactics, sustainability projects are becoming more and more well-known. Libraries are responding to these shifts by creating creative solutions, including collaborations, environmental initiatives, and AI integration, all while overcoming financial limitations. To remain relevant, they are adopting cutting-edge strategies like AI-powered services, collaborations, sustainability, virtual and alternative reality technologies, open data initiatives, maker spaces, & creative labs. Libraries are implementing cutting-edge solutions to address a variety of community needs and encourage lifelong learning, despite obstacles such as limited financing, evolving librarian roles, privacy and security concerns, and adjusting to changing societal standards.**

***Index Terms*—Twenty-First Century Academic Libraries, Cutting-Edge Creative Solutions, AI-Powered Services, Digitization, Changing Demands of Society.**

1. INTRODUCTION

Libraries are becoming vibrant centres of knowledge, education, and cultural enrichment rather than just being stores of printed material. Libraries' future is a complicated tapestry of creative problem-solving, community involvement, and technology development. Traditionally in charge of collecting, cataloguing, and preserving materials, academic libraries now use technology to support research, foster collaboration, offer round-the-clock information services, and advance information literacy. With the ICT revolution changing educational institutions, the 21st century has witnessed a dramatic shift towards digitalization. Incorporating technical innovations such as computational collections, online catalogues, data analytics, & virtual research aids, the goal is to clarify the role of academy libraries in promoting research and educational activities in a digital, connected world. One significant trend is the digital transformation, where libraries use digital resources such as e-books, audiobooks, & digital archives to remain current and accessible. To serve various interests, libraries are now developing into thriving community centres that hold lectures, workshops, and educational events. In this day and age, information skills and data literacy are equally essential. By assisting users in navigating the immense ocean of information, librarians play a critical role in promoting data literacy skills within patrons. Another revolutionary development is the incorporation of augmented and virtual reality technologies within library services. But libraries also have to confront issues like limited finances. Developing technology infrastructure, obtaining digital resources, and putting creative ideas into action all require adequate financing. To prepare for their expanding roles in a quickly changing information ecology, librarians must constantly learn and grow. Creative solutions, such as partnerships, sustainability programs, and the integration of AI, are shaping the next generation of libraries. Libraries are well-positioned to prosper as

vital organizations that promote knowledge, community, & cultural enrichment within the twenty-first century as they adjust to these trends and difficulties. The Dewey Decimal System, also known as DDS, changed library operations in the late 1800s. The system standardized the library's resource arrangement, making information searches easier. Modern technology, like computerized cataloguing, improves library management and collection organizing. Librarians are now information specialist facilitators since customers can search materials by many criteria. In the late 20th and early 21st centuries, the internet and digital databases transformed libraries as socioeconomic institutions and provided endless information beyond book collections. The Virtual Public Library in the United States & the European a project have helped libraries collaborate with educational and non-profit organizations across borders.

1.1. 21ST-CENTURY ACADEMIC LIBRARY KNOWLEDGE JOURNEY

As the 21st century transitions into the Information Age, students face additional obstacles in their academic journey. Some kids may consider it difficult to learn freely, develop knowledge, and comprehend its meaning. Due to its wide range of theoretical stances, research methodologies, and social ramifications, education has drawn more and more interest from both academic & public research circles. Technological advancements and the need to foster human growth have significantly impacted successful educational institutions. The goal of 21st-century learning is to assist students in gaining the abilities, dispositions, and information necessary to contribute positively to society. It encourages more sophisticated concepts and creative approaches to teaching, which helps both students and teachers establish a solid reputation for their ability to instruct and gain a better grasp of what they must do to succeed as learners. Although students have perceived the use of technological devices in the classroom as de-skilling, it has actually become a valuable tool for learning in the twenty-first century. Technology enables the creation of virtual learning environments, enhanced teaching methods, and global learning opportunities. One strategy teachers might employ to help kids reach better comprehension levels is the flipped classroom. Research on 21st-century learning has expanded with a greater focus on creating novel approaches, strategies, impact, and guidelines. Researchers must have access to trustworthy data, including bibliographic databases, to conduct efficient bibliometric analysis. With around 27 million records & the capacity to search and download articles and citations from over 24,000 academic publishers & societies worldwide, Scopus is one of the most frequently utilized open access databases to obtain scholars.

1.2 INNOVATIONS

Libraries are using cutting-edge approaches to overcome obstacles and become more dynamic, flexible, and technologically advanced organizations. By utilizing cutting-edge technologies, encouraging teamwork, and advancing sustainability, these innovations will ensure that libraries stay alive and relevant in the quickly changing 21st-century environment.

- Artificial Intelligence (AI)-Powered Services: Artificial intelligence (AI) is continuously transforming libraries. Libraries are utilizing artificial intelligence algorithms to enhance user experiences and streamline their operations. AI is being used by librarians to offer individualized services, including making recommendations for customized reading lists and responding to reference inquiries. In addition to fulfilling the changing needs of a tech-savvy audience, these sophisticated solutions help libraries operate more efficiently by freeing up librarians to concentrate on more difficult jobs.
- Partnerships and Collaborations: Libraries are realizing the value of partnerships and collaborations. Libraries can access pooled resources, knowledge, and creative activities by partnering with other academic institutions, neighbourhood associations, and tech firms. Libraries may provide more varieties of services that address the many needs & demands of their communities by working together, which increases their effect.
- Sustainable Practices: Libraries that aim to reduce their environmental impact are increasingly prioritizing sustainability. From creating energy-efficient structures to putting green projects like community gardens and book recycling programs into place, libraries are embracing

environmentally friendly practices. Libraries are promoting a sense of cultural duty among their users in addition to improving the planet's well-being by coordinating with larger social objectives of environmental stewardship.

- Integration of Virtual and Augmented Reality: To provide engaging educational opportunities, libraries are adopting both augmented and virtual reality technologies. Augmented reality-enhanced resources, educational simulations, and virtual library tours provide interactive and captivating material. Libraries are changing how people interact with information by incorporating new technologies, which will make learning more engaging and dynamic, especially for younger audiences.
- Digital Inclusion Projects: Libraries are spearheading digital inclusion initiatives, recognizing the crucial role of equal access to information for all. By giving underprivileged populations access to resources and training, these initiatives seek to close the digital divide. Libraries have implemented proactive measures to guarantee that everyone in the community can take advantage of the advantages of the digital age, from providing Wi-Fi hotspots & digital gadgets for checkout to giving technological literacy programs.
- Open Data projects: Libraries are increasingly supporting initiatives that encourage accessibility and openness. Libraries support research, creativity, and well-informed decision-making in their communities by providing the public with free access to data sets. This movement places libraries in a position to promote the democratization of knowledge, which is consistent with the ideas of open access.
- Maker Spaces & Creative Laboratories: Libraries are remodelling their buildings to create maker spaces and creative laboratories. These spaces provide users access to resources and tools for experiential learning, including laser cutters, 3D printers, and audio-visual recording devices. Libraries are enabling patrons to experiment with new abilities and participate in experiential learning by encouraging creativity and innovation. In managing these developments, libraries are reinventing their roles as vibrant community centres and change agents in addition to embracing technology. Libraries are evolving to meet the diverse needs of their communities while remaining committed to their mission of facilitating access to information and promoting lifelong learning, which includes incorporating artificial intelligence (AI), sustainable practices, virtual reality activities, and collaborative efforts. Libraries are establishing themselves as vital organizations that support the social, cultural, and intellectual fabric of society as they develop further.
- Artificial Intelligence (AI)-Driven Academic Library Services: Academic library services driven by AI are transforming access to and management of information while providing a streamlined and customized user experience. These tools improve resource discovery, automate repetitive chores, and intelligently support learning and study. By automating library procedures and offering tailored recommendations, artificial intelligence (AI) and machine learning algorithms enhance information retrieval and discovery. AI-powered automation manages routine administrative duties, automates cataloguing, and forecasts material demand. Chatbots & virtual assistants driven by AI improve accessibility, offer round-the-clock reference services, and support cutting-edge research. AI plays a key role in managing and conserving both digital and physical library resources, including predictive maintenance, digitalization of delicate documents, and digital preservation. Nonetheless, algorithmic prejudice, data privacy issues, and the evolving role of librarians are ethical problems. Libraries must take proactive steps to address these problems and implement robust data protection procedures. Librarians must also modify their abilities to concentrate on more complex duties, such as curating specialized collections along with offering expert research assistance.

1.3 INNOVATIVE LIBRARY SERVICES

Innovative library services include OPEC search facilities, print and e-books, as well as full-text connections. Info-KIOSK Sending SMS or emails to research academics to provide information and remind them of source deadlines. Chat with librarians via QR

codes for library resources. For free online e-journals and books for researchers, ask a librarian.

- Cyber Library Study Centre: A well-equipped cyber library with computer terminals and powerful internet connectivity provides access to e-books, e-journals, databases, and e-theses. Audio supports visually impaired users: We create digital copies of print publications upon request to assist visually impaired university students. Students can access their chosen audio recordings from the collection. We believe this reading style greatly benefits blind or visually disabled people. We firmly advocate for the use of technological devices to simplify daily tasks for community members.
- Plagiarism detector: A plagiarism detector uses complex database techniques to identify matches between your creations and existing texts. Universities scan student assignments. Check your work for plagiarism using expert tools before submitting.
- Research Information section: This section provides online resources. The Research Information Service is an "alerting service" designed specifically for professionals and focused on their areas of interest. This service, launched in 2017, provides research-related knowledge specifically for university faculty and researchers. We assist researchers from various fields on an individual basis. Faculty and researchers make up the target audience.
- Mail-Based Internet Service: Online sources encompass publications, articles, reviews, abstracts, & more. The reference information section includes a periodicals section, a back volume section, a digital library section, a general reading hall, a conference/seminar hall, a discussion hall, generator facilities, and a reproduction library collection.

1.4 SIGNIFICANT ROLE AND ACHIEVING A DEVELOPED INDIA IN VIKSIT BHARAT 2047

In Viksit Bharat 2047, libraries will play a significant part in achieving a developed India on the 100th anniversary of independence. Libraries traditionally have large print holdings. However, they now encompass a diverse range of resources, including commercial releases of films, TV shows, recordings, music, and microforms. Many provide digital documents and bibliographic databases. Library type, size, and location affect services and user communities. Libraries often promote lifelong academic achievement and social participation as community hubs. Library expansion now provides electronic usage of resources, including remote access over the internet, enhancing inclusivity and accessibility.

1.4.1 THE RISE OF INNOVATIVE TECHNOLOGIES

In the 21st century, breakthrough technology led libraries to revamp their core services. This investigation shows how the digital revolution extends across society through observed changes. According to Cohen (2020), library technology advancements improve user service delivery by expanding information access to diverse social groupings. Library service evolution relies on the following:

- Digital Library Platforms: Libraries employ digital platforms to improve services by transforming resources into searchable formats for online access across locations and social backgrounds. Users can access various data collections via e-book, journal, audio-visual, and archive document resources on these platforms. According to Johnson (2021), successful digital platforms such as JSTOR, Project MUSE, and OER Commons use this technique. Adams (2022) states that digital libraries promote information democratization by providing access to scholarly publications and library collections beyond office hours.
- AI and Machine Learning: Artificial intelligence (AI) & machine learning have revolutionized library services by improving user information engagement. Chatbots provide speedy support to library patrons by answering inquiries and providing information without typical staff engagement. The method enhances customer satisfaction by providing prompt services, especially during unstaffed library hours. Huang (2022). According to Pritchard (2020), utilizing machine learning algorithms for evaluating user behaviour results in individualized recommendations that improve library resource interaction. Wang and Wang (2021) suggest that AI technology can predict user preferences and

adjust basic system parameters for libraries using comprehensive data.

- Mobile Apps As Smartphones Become More Popular: Mobile apps As smartphones become more popular, libraries have developed mobile apps to provide users with quick access to library materials anytime and anywhere. Common features of these apps include catalog searches, digital loans, event calendars, & resource recommendations. Morris (2021). Mobile technology allows libraries to provide individualized user experiences and boost interaction outside traditional locations. Kumar (2020). Mobile accessibility increases library use, especially among younger groups that prefer instructional information on their devices, according to research. Smith (2022).
- Tools for social media & Community Engagement: Modern libraries rely on social media to engage with their local communities. According to Hawkins (2019), libraries can promote events and resources on social media platforms such as Facebook, Twitter, and Instagram to engage the community. Virtual platforms enable educational institutions to establish relationships with diverse user groups and organize community feedback discussions. According to Jaeger & Bertot (2019), a successful social media strategy can help libraries increase their profiles & community ties, highlighting their vital position as information and resource providers.
- Augmented And Virtual Reality (VR and AR) Technologies: Augmented and virtual reality (VR and AR) technologies influence modern library design by providing interactive user experiences. Using modern technology, library customers can see virtual collections, run educational scenarios, and experience past occurrences through interactive participation. Taylor (2018). Innovative library engagement approaches attract people and enhance learning capacity. LeDuc (2021) confirms that combining virtual and augmented reality enhances educational outcomes by establishing real-world connections between library materials, which basic presentations often lack.

1.5 KEY LIBRARY CONTRIBUTIONS TO VIKSIT BHARAT 2047:

- Library as an Information Hub: Libraries are vital information hubs that assist education, research, orientation, and lifelong learning for all ages.
- Promoting Digital Cultural Literacy: Libraries provide technology, training, and resources to promote digital inclusion and bridge the digital gap.
- Community Engagement: Libraries serve as community centres, providing customized activities and services to promote social growth and inclusivity.
- Cultural Preservation: Library collections safeguard India's cultural heritage, including literature, traditional wisdom, and historical records.
- Promoting Research and Innovation: Libraries actively support research and innovation by providing access to scholarly publications, research tools, and collaborative spaces.
- Capacity Building for the Library Profession: The library systems provide ongoing training and development for librarians and community members, fostering excellence.
- Youth Empowerment: Library services provide educational and career resources to empower youth. They promote global knowledge exchange and best practices through multinational collaborations. Libraries are crucial institutions that support India's ambition of becoming an economically advanced country by 2047. Libraries, with their diversified services and community-driven initiatives, are not just knowledge repositories but also agents of change for Viksit Bharat.

1.6. THE IMPORTANCE OF USER-CENTERED DESIGN IN LIBRARY SERVICES

User-centred design (UCD) is a key driver of current library service technology, promoting enhanced user experiences. Using this strategy, institutions analyse user needs, preferences, and behaviour patterns to improve service and engagement. Libraries that prioritize user needs can provide timely services that improve satisfaction and sustain resource involvement. Usability-centred design

- The User-Cantered Design Concept: The user-centred design concept prioritizes user needs

throughout product and service development. According to Norman (2013), UCD begins with a thorough user needs assessment and environment analysis, resulting in user-friendly systems that mimic natural user actions. Libraries should research a user-centred design, including system interactions & the emotional, cognitive, and behavioural variables that influence user experiences.

- Improving Library Services: To support their services, UCD libraries utilize developing technologies such as integrated library systems, digital archives, mobile apps, and interactive websites. Implementing UCD allows libraries to tailor their technology to end-user needs. Gulliksen et al. (2003) found that involving users in product design directly reduces usability issues. Alignment between users & service designers promotes service efficacy and usage. The main feature of UCD is ongoing user input collection. Libraries can access user experiences and impressions using survey, focus group, and usability testing methodologies. Sweeney et al. (2016) found that customers report increased satisfaction when they see staff using their input to improve library services. Through ongoing assessment, users feel loyal, and service personnel gain feedback to adapt to changing needs.
- Continuous Evaluation and Improvement: Library technology systems are regularly assessed to ensure user satisfaction. The library employs three assessment methods: website analytics, user experience feedback, and excellence standards in library resources and data science. According to Zhang et al. (2018), libraries that apply systematic user feedback evaluation and data interpretation to make strategic service enhancement decisions have achieved success. Regular assessments promote continual development and innovation in the library organization.

1.7 SCOPE AND LIMITATION: The research paper examines how several technologies, such as automated systems, digital catalogues, & artificial intelligence tools, affect library services and patrons. It does, however, recognize its limits, including the availability of materials, prejudice, quick development, knowledge updates, & ethical concerns.

2. REVIEW OF LITERATURE

Gautam, A.S. (2025). With the addition of digital resources, virtual libraries, & collaborative areas, academic libraries have changed to accommodate the demands of researchers, instructors, and students. Additionally, they promote social responsibility, collaboration, strategic alliances, and service customization. By adopting digital technology, encouraging co-creation, expanding digital information, and preserving open educational resources, libraries can transform into platforms. Increased accessibility, improved teamwork, quicker material availability, personalized assistance, adaptability, worldwide cooperation, lifelong learning, community development, sustainability, & cost savings are among the advantages. However, drawbacks include challenges with digital literacy, staff training, privacy concerns, ethical behaviour, and the loss of conventional space. Libraries must provide accessibility, engage the community, and strike a balance between the advantages of digital and traditional locations to make the move to digital platforms successful.

Gallouj and Djellal (2018) find the exclusion of libraries from these areas surprising, especially given the fear that the internet and its derivatives could lead to their extinction. Despite the competition, libraries have remained creative and made providing internet access a priority. Although there is a lot of literature on innovation in libraries in the discipline of library and information science (LIS), it is still very factual and descriptive. Identifying neglected service sectors and understanding their nature and dynamics are among the challenges noted in the study of service innovation.

3. METHODOLOGY

The article is divided into three primary sections: a basic representation of the "product," the operational breakdown of the "product," and a service-driven approach to library activities. This representation allows us to analytically and methodically account for the intricacy of the structure and patterns of creative thinking in libraries. With an emphasis on technological innovation and integration, this literature review examines both recent and emerging trends in academic libraries. The study identifies three

themes: updating libraries, incorporating new trends, and upcoming trends. We found 136 peer-reviewed papers using a thorough search technique. 32 open-access journals met the constraints of the evaluation study.

4. THE LIBRARY OF THE 21ST CENTURY: PROGRESSING TECHNOLOGY

Academic libraries are increasingly sophisticated knowledge management centres instead of just basic storage facilities, thanks to technological advances in information and communication (ICT). Applications that transcend time and location constraints, such as social media, cloud computing, web portals, open-source software, and online resources, make virtual libraries accessible. There are numerous new items that might be linked to the improvement of library management and services when we talk about the advancement of technology in libraries. The library initiated the implementation of new services to provide its patrons with knowledge and information. For instance, consumers may not have found the library's website to be sufficiently engaging a few years ago. However, websites can now link to the rapidly expanding information-based engines, providing them with a fantastic appearance and feel. People think it's easier to use and more user-friendly. Other technological innovations that aid the library in serving its patrons include RFID, automatic checkout systems, and online databases. The electronic book service starting at the airport is another recent technological development. A new library at the Kuala Lumpur, Malaysia, and International Airport provides passengers with free e-books. Based on the ideas of geo-fencing micro-location technology, this smart facility uses Bluetooth beacon signals to function. It connects to a passenger's smartphone app, providing them with access to a unique online book library.

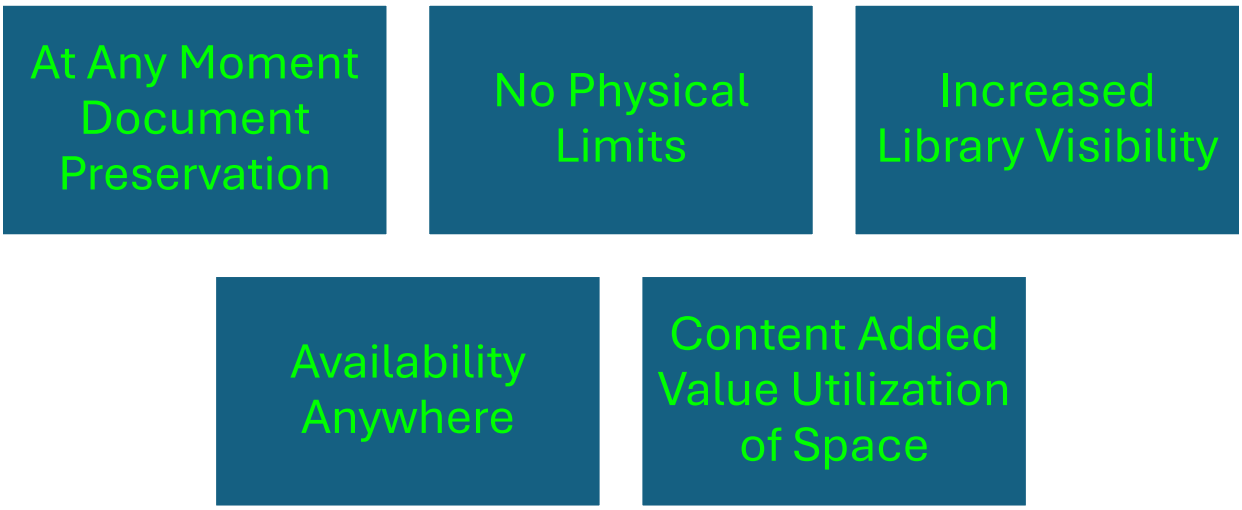
- **Geographic information systems:** Libraries can use geographic information systems (GIS) to efficiently locate and arrange structural data, including maps and geographic references. With the use of geospatial databases and mapping tools, users can analyze maps, satellite images, and geographic data for various purposes. With the use of mobile applications that provide interior navigation, GIS enables the addition of location-based services that assist library patrons in finding books and other resources within the facility. Libraries can engage with local communities by hosting GIS-focused seminars, projects, and instructional activities like community visualization, environmental education, & cultural heritage preservation.
- **Robotics:** Libraries are utilizing robotics as automation, digitization, and artificial intelligence continue to advance. Robotics technology has advanced over many years. Libraries are using robotics to improve services and modernize their operations. Additionally, they might receive training to lead tours or take part in interactive learning activities, which would increase the appeal and accessibility of libraries for patrons. Through process optimization and the creation of new opportunities for engagement, robotics in libraries helps the institution achieve its mission of facilitating access to resources and knowledge. They might provide 24/7 support, allowing library staff to take on more challenging tasks. People with disabilities can also profit from robotics. Robots collecting or storing personal data could raise security and privacy concerns. Expensive start-up and continuing maintenance expenditures could be quite harmful. Some customers could find robots frightening or would rather communicate with people. Using robotic arms or a conveyor belt system, robot librarians may take books off shelves or storage facilities. Customers can use the library's online catalogue or a pre-designed interface to order certain books as well as other items. Robots trained with sensors, cameras, and mapping technology can scrutinize the library's architecture. They are able to move across bookshelves, locate the right one, and steal it. Some robot librarians can talk and have interactive displays. Users can communicate with the robot to enter the information they want, get directions, or learn about the library's resources.
- **Chatbots:** Library Chatbots will be computerized conversational agents that help patrons with various tasks, including responding to inquiries, offering advice on research, and providing details on the resources and services offered by the library. They are able to interpret user input, identify intent, and offer pertinent answers. Many connect to databases and library catalogues to obtain information in real time. These AI-

powered solutions enable libraries to provide effective and individualized assistance to their users, simultaneously freeing up staff to perform more difficult duties by increasing user engagement, improving accessibility, and providing round-the-clock support. They increase accessibility and user engagement. Among its drawbacks could be chatbots' inability to comprehend intricate or situation-specific queries. They don't have the human touch of interaction. Consider the costs associated with implementation and upkeep.

- **Blockchain:** This technology makes it difficult or impossible to alter, compromise, or take over the system. Libraries will use block chain technology in the future to safeguard patron and user data, enhance user privacy, and streamline research paper data. Experts predict that block chain technology will trigger a significant revolution. Public and private keys, a secure authentication method that safeguards user privacy, are a significant component of block chain technology. Privacy is guaranteed since it is challenging to change the public key toward the private key. Because it is difficult to convert the public key toward the private key, privacy is ensured. Since only the public key is associated with users, it is possible to query and examine the contents of every block of data. The amount that can be encoded as a block is now limited. As technology develops, it will become feasible to create more intricate data links and to incorporate data in non-PDF, image, audio, and video formats that weren't previously linked to block chain. The technology will be a crucial component of libraries because it can authenticate and preserve digital artefacts that may serve as substitutes for physical assets, such as contracts or 3D models.
- **Artificial Intelligence (AI):** The concept of artificial intelligence (AI) first emerged in the middle of the twentieth century when researchers began developing computer programs to mimic human thought processes. AI is now widely used in various industries, including libraries, to enhance products and user experiences. Computer programs that possess the ability to learn, solve problems, reason, and comprehend language are known as artificial intelligence (AI) systems. The goal of these programs is to mimic human thought processes. More accurate search results, personalized services, time-saving task automation, and round-the-clock customer support are all features it will offer. Important obstacles include concerns regarding privacy, the need for strong data protection, and the possibility of employment displacement for specific library jobs. AI systems may also require frequent maintenance and enhancements. AI-powered search engines will drastically change libraries in the future. Contextual & semantic search will allow consumers to find what they need even if they don't utilize specific terms. AI will analyze user behaviour and preferences to offer personalized recommendations. For example, depending on a user's past borrowing habits and interests, it can suggest books, articles, and other resources, making it easier for users to discover new content that fits their tastes. AI can also monitor the usage and popularity of various resources, which helps with decision-making on the expansion, deletion, or addition of the library's holdings. AI will play a key role in automating the computerization of physical items.
- **DIGITIZATION:** Librarians must be trained in contemporary technologies and run patron awareness programs to guarantee correct deployment. A successful implementation can improve library services by strengthening relationships between stakeholders and librarians. To sustain innovation, all services must be integrated into a web-based system. Modern infrastructure & digitization require continuous policies and adequate investment. Even with improvements, incorporating digital content through library services remains a challenge for underdeveloped countries. By systematically adopting new trends and improving the educational experience, libraries can have a big impact on future educational results. They are vibrant institutions that offer a supportive setting for learning, research, and knowledge creation. Libraries must change and adapt to suit the evolving demands of researchers, staff, and students in order to keep up with technological improvements. The library has a wealth of knowledge and information in its collection. As is well known, the library houses far too many tangible collections. It needs a lot of room. The

majority of libraries have been working on the digitalization project since the beginning of 2000. The act of transforming tangible documents such as sound, paper, or images into an electronic format that computers and other electronic devices can read is known as digitization or digitalization. We will then use the Internet to make those records accessible. Preserving the library's actual collection is one of the initiative's primary goals. The library has implemented an additional value service to attract more patrons through this strategy.

- **Web 2.0 and New Media:** In the age of digital technology, the rise of social media and Web 2.0 applications adds value to any institution, including libraries, and strengthens their bonds with patrons. One way to define social media is as a communication tool that allows other users to react to a topic or issue right away. These days, consumers most frequently utilize apps like Facebook, Instagram, Twitter, Flickr, and Blog. The library may utilize this application as a communication tool to provide its patrons with information. For instance, one can view it on a tablet or smartphone. The library places more emphasis on statistics when it uses social media. The more patrons a library receives, the more people are aware of its announcements and can speak with staff members directly about issues that are posted. The term "information literacy" refers to the ability to obtain, assess, arrange, and apply information from various sources. The sources may come from databases, CD-ROMs, the Internet, or the actual collections of the library. The library is planning seven information literacy programs to teach patrons how to access its resources.
- **Library Structure and Amenities:** These days, libraries serve more purposes than merely lending out books or offering study spaces; they also offer more amenities than they did in the past. Services and facilities are evolving in response to user demands and interests. Libraries are becoming places for social networking and research. With the current technological trend, libraries are offering a lot of new services, like Wi-Fi. This feature is in addition to the digital services that the library offers. Additionally, the library offers classrooms and a discussion room for all additional departments to use for workshops or group discussions. These days, a library may also include computer training rooms, career counselling services, a coffee shop, and a place to complete homework. For example, the Malaysian Public Library Corporation offers its patrons a café, a gym, and 3D theatres within the library. We could enumerate a few benefits of digital libraries:



- Libraries as Centres for Innovative Education: In addition to being places for socializing and studying, libraries are also places where people go to unwind. Students use university libraries as if they were a second home. The library is where the majority of students spend their time. The majority of patrons at public libraries were of all ages, races, backgrounds, and educational levels.

4.1 TRENDS

The technological developments of the twenty-first century could help libraries, enterprises, industries, governments, and educational institutions. Libraries need to change with the times by introducing digital forms for convenient and distant access. The proliferation of information technology, including computers, the internet, and Wi-Fi connections, has altered organizational goals and outcomes. Publication technology, in which libraries release information sources & monographs, marked the beginning of the emergence of technology adhering to library contexts. Driven by technical breakthroughs and evolving cultural paradigms, trends in the development of libraries show a dynamic reaction to the evolving requirements of society. These developments are transforming libraries into dynamic, flexible establishments that will continue to have an impact and be relevant in the digital era.

- AI-Powered Services: Artificial intelligence (AI) is influencing library services. Libraries are utilizing artificial intelligence (AI) algorithms to enhance customer experiences, streamline processes, and offer tailored services. By providing personalized reading list recommendations and responding to reference inquiries, AI-powered services enhance the efficacy and efficiency of library operations. This pattern demonstrates the strategic integration of technology to improve traditional library services and meet the evolving needs of tech-savvy patrons. By providing sophisticated, personalized tools for information management, processing, retrieval, and searching, artificial intelligence (AI) technology has completely transformed library services. For jobs like information literacy along with reference services, librarians can leverage AI tools like chatbots, machine-readable catalogues, and RFID technology. Security scanning devices monitoring entry points and exits are common AI tools at university libraries.
- Automation of Libraries: Very few libraries began managing their collections with computers in the 1960s. Previously, the emphasis was on efficiently automating the cataloguing and circulation operations. Integrated library systems (ILS) served as a central location for library housekeeping activities in the 1980s and 1990s, combining multiple library services into a single piece of software. ILS oversees cataloguing, circulation, & patron services as the internet expands globally, frequently combining digital resources and online catalogues. The general usefulness and accessibility of libraries have been improved throughout time by the incorporation of cutting-edge elements, including RFID technology, self-checkout, and interlibrary loan management into library automation software such as KOHA, Evergreen, Sierra, SOUL, and Libsys. Better artificial intelligence-based search and recommendation tools for users, better data analytics, and increased format compatibility will be the hallmarks of library automation in the future. Managing resources, enhancing user access, and streamlining housekeeping procedures are all benefits of automating libraries. However, the greater installation and staff training costs, along with worries about user data security and privacy, are some of the challenges associated with library automation.
- Community Hubs: The rise of community hubs represents a dramatic change in the function of libraries. Libraries are becoming multipurpose establishments that serve purposes beyond just lending books. Libraries are evolving into thriving centres that hold workshops, lectures, and other educational events as they realize how important it is to build community ties. This movement places libraries at the forefront of community involvement as hubs for social interaction, cultural exchange, and lifelong learning.
- Current Awareness Services (CAS): Current Awareness Services (CAS) are crucial resources for people and organizations who want to remain up-to-date on developments and trends in their fields of interest. By giving customers the ability to customize their choices, sources, and delivery frequency, these services provide a personalized approach to information dissemination. The need to control and personalize the information flow in the digital age gave rise to CAS. More advanced AI-driven content curation, real-time updates, and collaboration with cutting-edge technologies, including augmented and virtual reality, are probably in store for CAS developments in the future, which will give users immersive & interactive information experiences.

- Data Literacy & Information Skills: Libraries are experiencing a significant shift in the era of information overload by emphasizing both data literacy and information skills. The role of librarians as advisors in navigating the enormous ocean of knowledge is growing. They are educators as well as book curators, equipping users with the knowledge and abilities necessary to assess sources critically, identify trustworthy material, and negotiate the intricacies of the digital information environment. This pattern illustrates how libraries are becoming more and more important as information literacy advocates in a world that is changing quickly.
- Database: Books, journals, periodicals, multimedia materials, and other resources that can be searched online are just a few of the many materials that are stored and managed in a library database. Libraries purchase database subscriptions to assist patrons in efficiently searching, locating, and accessing library items across various topics. Users can access the e-resources from anywhere at any time using PCs or mobile devices. It resolves the issue of time and distance. Users have access to all of a library's catalogues, whether they are available online, in print, or connected to its management system. The databases will be divided into groups based on their intended function, content, and user base. Academic, reference, and open-access databases are common types of library databases. World Cat, ProQuest, JSTOR, & Scopus are some of the databases available through the library.
- FAQ Section: It saves users time and eliminates the need for telephone or in-person inquiries to obtain knowledge about the library by covering various frequently asked questions and offering succinct, understandable responses regarding library policy, services, and materials without requiring users to get in touch with library staff. People look for answers to a number of commonly asked questions (FAQs) in libraries. They might inquire about how to obtain a library card, how many computers along with Wi-Fi are available, how to recommend new additions to the collection, the manner in which to request particular books during library hours—it's important to know when the library is open—and how to access e-books and other digital media regarding personal devices. FAQs are intended to assist patrons in efficiently utilizing the library's resources and services.
- Instant Messaging, SMS, and Email: The latter part of the century saw the beginning of the usage of email, instant messaging, and short message services (SMS) in libraries. By using these technologies in libraries, patron engagement is increased, evolving requirements and expectations are met, resource management is improved, time returns are increased, and customer satisfaction is raised. Users receive notifications from email and SMS services about the issuance and return dates of their books. This ensures that the library's resources are promptly available for other customers and helps users escape late fees. Additionally, this service notifies consumers via text messages or email when booked books are available for pickup. Users can receive alerts about late return fines, which encourage prompt returns and aid the library in revenue collection. Libraries use email notifications to inform patrons about upcoming events, acquisitions, and other significant developments. Users can ask inquiries or receive assistance with their research needs remotely through instant messaging or chat services. Based on their prior usage and personal choices, users may receive more tailored notifications, reminders, and recommendations from these services in the future.
- Integration of Virtual and Augmented Reality: Libraries are progressively adding these technologies to their offerings. These immersive technologies provide dynamic and captivating content, adding new dimensions to educational experiences. Libraries are using technology to engage and educate patrons in novel ways, such as through augmented reality-enhanced materials, educational simulations, and virtual library tours. This trend puts libraries at the nexus of education and technology, increasing their ability to provide memorable and powerful experiences.
- Interlibrary Loan: By submitting a request to a particular library, patrons of one library can obtain materials from another. The program allows patrons to obtain materials that are not available at their local library. During this process, more than two libraries come to an

agreement to exchange online catalogues and physical resources. Digital document delivery systems regarding electronic materials, online union catalogues, ILL administration software, and integrated library management systems are among the technologies utilized to create the library's interlibrary loan services. Together, these technologies improve patrons' access to resources by streamlining the loan and borrowing procedure between libraries.

- JSTOR: JSTOR is an online resource that provides electronic access to books, scholarly journals, and primary source materials. JSTOR, a non-profit, preserves and promotes intellectual content alongside libraries, museums, and publishers. They offer sustainable, cheap access to a broad collection of primary as well as secondary materials globally using innovative technology. Current and future scholars can access content through JSTOR's academic and educational platform and unique collections stewardship tools. The organization reduces prices, expands access, and preserves scholarship to advance knowledge and education. Workspace, JSTOR's artificial intelligence-powered research tool, lets scholars find insights, evaluate texts, and acquire more. Workspace simplifies research by saving and annotating folders, subfolders, and things. Learners and educators can collaborate in real time, engage using scholarly content, and gain new insights with JSTOR's features. The portal provides a complete research experience with text, graphics, audio, and video.
- Kindle: Amazon launched the Kindle line of e-readers and electronic book readers in November 2007. The primary use of these devices is to read electronic books along with additional materials. Because of their unique E-ink display technology, which mimics the look of printed text on paper, Kindles are easy on the eyes and highly readable, even in direct sunlight. Customers can download newspapers, magazines, e-books, and other digital products using kindle. These gadgets have capabilities including audiobook compatibility, waterproofing, and built-in lighting. Because of their convenience, portability, and digital library capabilities, they have become more and more popular among readers. Using the library's digital borrowing system, patrons can easily access e-books on Kindles; Kindle e-readers are available for loan. A set period of time allows customers to check out e-books before they automatically return them. The cost of setting up Kindles in libraries is subject to change. It includes the price of purchasing Kindle devices, electronic books (which need a license), and continuing upkeep. Kindle users are able to carry and use a substantial collection of digital books with only one portable device. Not all books are accessible digitally, and sharing & reselling e-books have limitations. It's likely that future Kindle readers will feature even more advanced screens like colour E-Ink and longer battery lives.
- Library website & FAQ: IT professionals create and manage library websites much like they do any other website. The library's own IT team, outside web development companies, or domestic professionals may have initially developed the website. The website serves as a one-stop shop for anything related to libraries. Its user-friendly design, simple navigation, and contemporary technologies all contribute to a better user experience. The website provides users with easy access to the library's digital resources, such as databases and e-books, along with e-journals, as well as details about the catalogue, policies, and contact information, from any location with an internet connection. It increases community involvement by promoting library programs, activities, and unique collections. With tools like chat rooms and contact forms, it also makes it easier for patrons and library employees to communicate. For instance, the IIM Ahmedabad website.
- ProQuest provides access to academic and research materials covering subjects such as technology, social sciences, and natural sciences. ProQuest One Education's interface is simple for education, studying, and conducting research. It has several academic publications, books, films, reports, dissertations, & news stories. The platform, which is the only flexible full-text education system that identifies all content based on the ERIC thesaurus, has been divided into research categories. Students can conduct targeted searches, analyse documents, and query them with the AI-powered ProQuest Research Assistant. It also helps students handle

sustainability challenges and recommends next steps. ProQuest One Sustainability offers transdisciplinary research on the U.N.'s Sustainable Development objectives, the three sustainability pillars, and essential skills. The marketing toolkit, support desk, & educational LibGuide are all available.

- In libraries, RFID (Radio-Frequency Identification) technologies have replaced traditional barcodes. RFID technology is made up of integrated circuits, antennas, readers, middleware software, & a range of materials that can be attached to objects in the form of RFID tags. The tags contain a microprocessor for data storage and an antenna for connectivity. Given how much the systems depend on it, the middleware is made to help the reader and ILS communicate. Media and library resources both contain tags. It speeds up material check-out and return, streamlines procedures, and reduces employee workload. With security gates and alarms that self-activate or deactivate in reaction to unauthorized material removal, this system's high inventory tracking accuracy reduces the likelihood of errors in shelving and cataloguing while simultaneously enhancing security. Self-service kiosks and shorter wait times improve the clientele's experience. Libraries can easily conduct inventory audits and locate missing materials. In addition to regular maintenance, RFID systems need to have their tags and equipment replaced on a regular basis. Only a few libraries are having trouble implementing RFID because tags, scanners, & system integration are expensive. Nevertheless, libraries must address privacy concerns and ensure that employees receive adequate training to utilize new technologies.
- Sustainability Initiatives: Implementing sustainability initiatives has become a progressive trend among libraries. Libraries are adopting eco-friendly building designs, resource management, and community engagement strategies as a result of growing awareness of their environmental impact. Libraries' energy-efficient structures, book recycling initiatives, and community gardens all support society's larger environmental responsibility objectives. This pattern demonstrates the library's dedication to sustainable practices, which foster a healthy earth in addition to intellectual enrichment. By following such developments, libraries are actively influencing the landscape rather than only responding to it. Libraries are establishing themselves as vibrant, pertinent, and essential organizations in the twenty-first century by adopting digital transformation, fostering community ties, promoting data literacy, incorporating immersive technology, utilizing artificial intelligence, and implementing sustainable practices. Together, these patterns highlight how resilient and flexible libraries are as they alter to accommodate the various demands of their communities in a time of swift change.
- The shift to digital: The ongoing digital transformation process remains at the forefront of library trends. To accommodate the wide range of tastes of its users, libraries are adopting digital resources and are no longer limited to the world of physical books. Digital archives, e-books, and audiobooks are becoming essential parts of library collections because they provide easy access to digital material. This recent development not only fits with the public's evolving reading preferences, but it also broadens libraries' reach beyond regional limitations.
- Internet of Things, or IoT: A technology known as the Internet of Things, or IoT, makes it possible to access data through internet-connected systems and devices, facilitating information gathering, analysis, storage, and sharing. Additionally, it can be utilized for online services and collection administration, transforming university libraries into vibrant centres of research and learning. Automated circulation systems, RFID-driven record management, smart lighting, encrypted gates, fire detection systems, and drones for student and stack monitoring are examples of IoT practices. Smart shelves with RFID tags for tracking inventory, quick response codes for accessing digital content, heating and ventilation systems for controlling temperature, light sensors for saving energy, security cameras, and early detection systems for water leaks and fires are just some ways the Internet of Things (IoT) has improved library operations.

4.2: WHY LIBRARY INNOVATION?

Innovation: Change and innovation are frequently utilized interchangeably. Traditionally, innovation refers to any new idea, activity, or object that individuals or organizations either adopt or reject. As the information environment and ICT industry undergo significant changes, library administrators are interested in adjusting to these developments. Staff should be encouraged to generate new ideas so they are active participants. Librarians are often the first to adapt and use new information and communication technology, contrary to expectations. Libraries and librarians face enormous problems that are diverse and complicated. The library is moving its focus from supply to client needs. The importance of information reference is increasing in line with this trend. The library gains a gateway function that allows access to knowledge regardless of its physical location. Due to increased internet access, library services are merging with education. Research shows a similar trend.

4.3 INNOVATIVE LIBRARY SERVICES

Innovative library services use technology, creative programming, & community collaborations to adapt to the digital age. These services improve user experiences and digital inclusion. Innovating new ideas like digital and virtual libraries is complicated. Creative professionals or teams suggest new and innovative ideas for libraries. Libraries can better assist their communities and support patrons by automating and mechanizing various technologies**.**

4.4 INNOVATION IN LIBRARY SERVICES USING WEB 2.0

"Library 2.0" is a novel and important phrase based on Web 2.0 technology. This innovation transforms the library system and revolutionizes digital libraries. Library 2.0 simplifies library services, allowing consumers to access facilities from home at affordable prices. Library 2.0 offers a digital library service accessible via computers and mobile devices. The growing demand for smart & Android phones is leading to a decline in physical library services, as people choose Library 2.0. Multiple library users report carrying a library within their pockets. Additionally, Library 2.0 services undergo constant examination and updates to meet evolving user needs. Like traditional library services, these new ones are available to anyone, regardless of location.

- Innovating Library Services with Open-Source Software: Koha is a prominent open-source library management system. This library management system is utilized by libraries of all sizes worldwide. The system includes modules for cataloguing, circulation acquisition, serials management, and online public access cataloguing.
- OpenKM: OpenKM is an open-source document management system that may also be used for library administration. Features include document indexing, search, version management, access control, and OPAC. Greenstone serves as open-source digital library software that allows users to develop and distribute digital collections. Features include collection building, metadata production, searching, and browsing.
- Omeka is a free, open-source web publishing platform designed for creating digital collections and online exhibitions. It offers functionality for creating metadata, uploading content, and building displays. Evergreen is an open-source library system that includes modules supporting cataloguing, circulation, acquisition, serials administration, and an OPAC.
- Innovative Library Services: Libraries offer a variety of services to facilitate user access to resources and address information needs.
- Some common library services: Circulation services enable customers to borrow and then return library materials. This technique of innovation involves automation. Services offered include checking out things, renewing materials, and managing fines.
- Interlibrary Loan: Users can request materials from other libraries that are not in their collection. Apps or websites given by the library perform this task.
- Information Literacy Instruction: Information literacy services train users to identify, assess, and use digital resources effectively. This may involve workshops, webinars, classes, and online tutorials.
- Technology Services: Users can utilize computers, printers, scanners, and other technology tools. This may involve assisting with technical concerns such as software installation and debugging.

- Outreach & Community Engagement: Promote library services to the community. This could involve forming connections between schools, community organizations, and local companies. Innovative library services aim to complement the purpose and provide users with essential information for academic, professional, and personal success. Libraries are increasing their digital holdings to include e-books, e-journals, audiobooks, and digital periodicals for borrowing and reading on multiple devices. With internet platforms and apps, people can access a wide range of digital resources anytime, anywhere.
- Digital Media Labs: Libraries will have digital audio & video recording equipment, editing software, and other multimedia capabilities. These labs offer resources and space for creating digital material like podcasts, films, and music.
- Mobile Libraries: Mobile libraries offer books, resources, and technology to underserved communities, bypassing traditional brick-and-mortar locations. These mobile libraries offer information and services to individuals with restricted transportation or proximity to a physical library. Libraries acknowledge the critical nature of digital skills and offer programs that teach basic computer skills, internet usage, and security when using the internet, coding, and other digital competencies. These programs help indivi
- Community Partnership: Libraries collaborate with local organizations, schools, and companies to enhance their services. Collaborations can involve hosting workshops, sharing specialist resources, co-organizing events, and implementing community-beneficial programs. Library settings are becoming more flexible and technology-rich, enabling collaboration, group work, and interactive learning. These rooms may contain collaborative workstations, interactive displays, and virtual collaboration tools to foster creativity and information exchange. Podcasts comprise either video or audio programs released digitally using standard formats like MP3 and MP4 and distributed by RSS subscription. RSS Feed Readers (also known as news readers) allow users to subscribe to their preferred portals & monitor fresh content without visiting the site directly. Most websites, blogs, online newspapers, and social media platforms now use RSS or the ATOM code. While podcasts and RSS readers are effective tools for following technology news, librarians may also consider using Twitter (http://www.twitter.com), a prominent Web 2.0 messaging service. Users can utilize Twitter to create an individual profile and publish library experiments as an outreach tool. Users use Twitter accounts for outreach, sharing news, events, and links with other users. Nonetheless, Twitter offers a robust, personalized news feed.
- Web Publishing: WordPress initially started as lightweight, free, and open-source software. The website features a visual editor for publishing text and photos, multiple authors with separate log-ins, RSS technology for subscriber updates, and a common system for reader interaction and contact. This tool is excellent for communicating with users, staff, and others.
- Drupal: Libraries may investigate Drupal as a web publishing alternative. It has been used to create community-based websites with extensive content management. Examples include online portals, corporate websites, and intranet apps.
- MediaWiki: MediaWiki, the original software behind Wikipedia, enables people to generate and edit information with a simple interface. Twiki, an open-source wiki platform, can not only replace web publishing but also serve as a platform for libraries to maintain and update maintenance and training information as operations evolve. The list of services where libraries can efficiently utilize Internet & Web Technology is available. Use online stores like Amazon, Barnes & Noble, Flipkart, and Crossword to acquire books. The document was classified with the DDC Online and the Library of Congress online categorization systems.
- Resource Development: Joins library consortia programs to subscribe to print and e-format publications. To catalogue library resources, use web OPACs and browse online catalogues like the Library of Congress Catalogue.
- Circulation: remote login, book availability checks, OPAC access, reminders, user requests, direct borrowing, interlibrary loan.
- Resource Sharing: Union Catalogue, Network Database Access.

- Subject Gateways: SOSIG (social sciences), ADAM (arts design), EEVL (engineering), and OMNI (medicine).

4.5 INNOVATIVE SETS

- Library Content Search: Library content search using OPAC and Web OPAC. OPAC stands for Online Public Access Catalogue. A library database allows users to access study resources (books, CDs, DVDs, audio cassettes, videotapes, articles, etcetera) available in the library or collection of libraries. Web OPAC enables library customers to access the Online Public Access Catalogue from home. This innovative tool saves users time searching for study materials in multiple libraries.
- RFID Library Function: RFID is a wireless system that uses electromagnetic fields for identification and automatically tracks the chips associated with library books and items. This system automatically tracks the chip linked to library books and items. This self-service technique allows library users to retrieve their desired books and automatically records their identification, name, and date of issue in the e-register. To prevent theft, the library uses an RFID system to restrict access to books and materials and requires adequate registration of supplied books and users. Library users must be members to use the facilities, & the nominal charges and materials will be automatically withdrawn from their bank balance. It also aids in organizing library contents. This system requires fewer human resources and reduces the monotony of librarian labour.
- The National Technology-Enhanced Learning Program: This curriculum offers e-learning capabilities through online, web, and multimedia courses. Currently, e-learning using interactive web & video courses has transformed the education sector by connecting experts with interested scholars in certain disciplines. The use of NPTEL in libraries can enhance students' knowledge and learning. Even pupils from rural or backward areas can afford these advantages. Students benefit from classes such as CA & CS adhering to Kolkata, Engineering & Medical Entrance Examinations in Kota, and Management Classes in Delhi. Students with high-speed Internet can access library services from home by paying a small fee at neighbouring libraries or via net banking as well as mobile banking. Expert faculty from top technical universities like IITs and IIMs can share their knowledge and insights with students worldwide.
- DELNET Interlibrary Loan: The Indian Global Library founded DELNET in January 1988 & registered it as a society in 1992. Initial support came from NISSAT, Department of Research in Science and Technology, Government of India. The project received support from the National Informatics Centre, Department of Technology and Information, Ministry of Information Technologies and Communications, and Ministry of Culture, Government of India. Libraries are unable to house every category of materials in one location. The main goal of this establishment is to encourage resource sharing among libraries. A library user can access study materials from another library using DELNET. Under the Interlibrary Loan System, a library user can request resources from an additional library for a specific duration. Research academics benefit from such facilities.
- Semi-Public Library Development: Many individuals, including students, faculty, and academics, as well as servicepersons, homemakers, and businessmen pursuing higher education, are interested in using library facilities. The lack of public libraries in any region makes it challenging to access library services. University students and faculty are the only ones who can use libraries. Local residents and students from other institutions are denied access to library facilities. The conversion of university libraries into semi-public libraries is a novel idea that benefits both local customers and the concerned universities. Universities can convert their libraries toward public libraries to obtain limited hours per day, collecting high fees from outside users to fund future maintenance and improvements. These facilities will significantly strengthen the knowledge and learning levels of societies and the nation.

4.6 DR. S.R. RANGANATHAN INNOVATIVE DECISIONS SUPPORTED BY THE FIVE LAWS OF LIBRARY SCIENCE

- The First Law: The First Law states that the fundamental purpose for advanced library needs is to create accessible books for readers. Preserving outstanding works of literature, scientific research, and art digitally can achieve this goal. Explore technology like OPAC/WEB and WEB 2.0 to offer people different access methods.
- The Second Law: Libraries should have a comprehensive collection to serve the entire community. This repository serves as an open-source educational animation library and supports the national mission with ICT for education by providing animations for online lectures via NPTEL.
- The Third Law: The Third Law dictates that we should promote rarely used books to relevant readers. To attract useful users, the book description and contents should be released through OPAC.
- The Fourth Law: According to the Fourth Law, users are better satisfied when they discover what they need quickly. The library interface will allow quick access to study materials, boosting user loyalty.
- The fifth law: Libraries should diversify, innovate, and adapt to users. Without necessary human and organizational adjustments, the library cannot function effectively or achieve its goals. The bulk of public libraries in rural India offer a fantastic chance for cybercafés and government e-governance programs.

Cases like

- Gyandoot: a web page in Dhar, Madhya Pradesh, connecting rural cybercafés and providing services such as landowner passbooks and BPL family lists.
- E-GOVERNANCE CENTERS: E-governance centres like the Akshaya Project (Kerala) libraries can grow to serve as career counselling centres for youngsters. Establishing semi-public libraries may serve the needs of many interested individuals in society. Librarians can expand their skills and knowledge using continuing education programs to fully utilize ICT technologies.

4.7 MODERN LIBRARY USERS DEMAND

Modern library users demand easy access to information, individualized services, and engaging experiences. Innovative libraries integrate evolving technology, user-centred design concepts, and collaborative partnerships to create dynamic, interactive places for learning, collaboration, and discovery. Innovative library services have objectives.

- Analyze changing library user needs and expectations in the digital age.
- Evaluate the consequences of innovative library services on information access and digital inclusion.
- Investigate how new library services promote user involvement, creativity, and lifelong learning.
- Examine the effective implementation of novel services in libraries through case studies & best practices.
- Assess the efficiency of novel library services in fulfilling user needs and obtaining desired documents.
- The aim is to provide libraries with research-based recommendations and guidance for the implementation or enhancement of innovative services. Libraries play a significant role in bridging the digital gap by offering equitable access to knowledge and technology in a digital society. Innovative services like digital literacy, mobile libraries, and virtual resources empower underprivileged communities, fostering digital inclusion and enabling full social participation.
- Enhancing User Engagement: Innovative library services encourage user interaction through interactive programming, creative spaces, multimedia resources, and immersive technologies. These services serve to attract and maintain library users but also promote lifelong learning, creativity, and innovation.

4.8 ACADEMY LIBRARIES CAN IMPLEMENT OR ADOPT THESE NOVEL LIBRARY SERVICES.

- Digital Library: Libraries are evolving with technology and time. IT has led to a decrease in library size from large to tiny. The compactness of libraries is attributed to information digitization. Today, resources are primarily electronic and perform their functions automatically. These libraries are known by several names, including electronic, digital, desktop, virtual, wall-less, and paperless. Digital libraries use digitized data to replace paper records. Libraries are heterogeneous. These tasks

involve digitizing, storing, linking, visualizing, using, publishing, managing, and sharing information. They enable immediate access to digital information through information technology. The invention of CD-ROM in the 1980s was a major turning point in the digitalization of information. The 1990s saw a shift towards digitalization because of networking, electronic document delivery, and online services. A virtual library offers access to information without physical resources, although it may include web-based materials. This library does not have physical books, magazines, or staff but instead publishes information directly to the public, who are primarily electronic users. The virtual library represents the result of virtual reality. The virtual library was created using hypermedia. Users construct a graphic representation for the library architecture from various angles and distances to create a virtual library. The user experiences movement within the library when using the mouse.

- Remote Access provides: E-Resources, which help libraries enhance teaching, learning, and research. By implementing an information distribution system, we can offer services and access collections to users.
- Ask a Librarian: All libraries should begin. Consult a librarian/library service. This program provides access to the library for all students, teachers, and researchers. Information is available on the institution's website.
- Virtual Webinars/Seminars: Users were not aware of online resources before the pandemic, but libraries created virtual programs to educate them on how to use them. Libraries have organized webinars on information literacy and research ethics to help users.
- Raising awareness of NDLI (National Digital Library of India): This digital repository offers a wide range of academic content in several forms and supports prominent Indian languages for all academic levels. Science, engineering, & social science students may use NDLI for free at https://www.ndl.gov.in. Students can benefit from online lectures, web courses, notes, and questions and solutions.
- Shodhganga: A digital repository of over 260,000 Indian electronic theses and dissertations, available to the scholarly community in open access. The e-Shodh Sindhu (https://ess.inflibnet.ac.in) offers access to over 10,000 core and peer-reviewed journals, as well as bibliographical, citation, and factual databases from various publishers and aggregators, including unified funded technical institutions (http://www.klibjlis.com).
- E-PG **PATHSHALA:** e-PG Pathshala grants access to all postgraduate courses. The Ministry of Human Resource Development (MHRD) launched it as part of its national education mission. Pathshala offers high-quality e-text, content, and video for postgraduate studies in social science, arts, visual arts, humanities, and mathematics.
- IT-powered library services: Libraries can provide a variety of IT services, such as RFID, information kiosks, and library blogs.
- RFID,
- Information kiosks, and C. library blogs. Information kiosk.
- Library Blog.
- at an OPAC (Online Public Access Catalogue)

4.9: THE IMPACT OF INNOVATIVE LIBRARY SERVICES

The impact of innovative library services is significant and widespread. Computerized libraries allow anyone to access data from anywhere in the world, expanding access to data. They have removed the restrictions of general settings, allowing data access 24/7. Innovative library services significantly impact education by enhancing student results, knowledge, critical thinking, and lifelong learning.

- Digital & Collaborative Education: Modern library services often include technologies for collaborative tasks, presentations, online debates, interactive learning, and hands-on experiences. Libraries contribute significantly to the advancement of digital literacy skills. Students can learn to access and evaluate digital resources, use technology efficiently, and develop information retrieval and critical analytical skills through new services.
- Encourage Innovation and Creativity: Encourage innovation and creativity by providing resources such as 3D printers, coding kits, robots, & multimedia production equipment. Libraries

provide resources for students to explore, experiment, and build critical thinking, problem-solving, & design skills. Innovative library services enable students to access educational resources and interact with librarians online, promoting both digital & remote learning. Libraries have helped digital and internet-based learning.

- Lifetime learning: Libraries support both formal education and ongoing personal development. Innovative library services foster a love of learning and cultural development through programs, education, and activities for all ages.
- Access to diverse materials: Innovative library services include e-books, databases, multimedia, and digital archives in addition to traditional books. Students have better access to knowledge and are more likely to conduct independent research.
- Enhanced data protection: Computerized libraries enable better protection of sensitive or rare resources, ensuring future accessibility.
- Increased accessibility: Advanced libraries simplify finding and locating clear data snippets. Clients can search by keyword, creator, title, and model, resulting in faster and more efficient results.
- Cost investment funds: Advanced libraries reduce costs for acquiring, storing, and maintaining materials such as books and diaries. Libraries can now expand their collection and provide more resources to their beneficiaries.
- Enhanced Cooperation and Sharing: Libraries can now collaborate and share assets more easily. The outcome has led to increased access to data for anyone, regardless of location or assets.
- User engagement: User engagement has increased due to computerized libraries' ability to engage with clients in new ways. User surveys and evaluations provide opportunities for clients to connect with materials and enhance the library's collection. Generally, modern library services have greatly improved data availability, conservation, accessibility, and user collaboration.

5. CHALLENGES

Libraries face several difficulties even if they are actively managing the waves of innovation and change. Negative attitudes, ignorance, poor use of digital resources, and a lack of training in digital literacy and technology competency make it difficult for academic libraries to adopt the trends of the digital transformation. Slow internet speed, inexperienced staff, and an inadequate power supply are the main causes of the slow adoption. To guarantee future functionality, facility studies and focused strategies are required. Confidentiality, security, expense, lack of policies, lack of administrative interest, experienced individuals, and lack of expertise, incompatibility, and complexity are some of the issues associated with IoT. Although the use of AI in academic libraries continues to be in its infancy, challenges include human error, technical difficulties, poor infrastructure, and erratic power sources. These challenges, which range from budgetary limitations to changing social norms, provide major roadblocks for libraries looking to be relevant and functional in the twenty-first century.

- Financial Limitations: The limitation of financial resources is one of the most significant issues libraries face. Due to their limited funding, many libraries are unable to quickly adjust to new trends. Financial investment is necessary for the development of technology infrastructure, the procurement of digital resources, and the execution of creative initiatives. To maintain and improve their services, libraries face the difficulty of obtaining sufficient funding, which frequently calls for lobbying to emphasize their vital role in adhering to the community.
- Librarians' Roles Are Changing: As libraries change, so do librarians' roles. These days, librarians are expected to be tech-savvy educators, information architects, & community builders in addition to being bookkeepers. To prepare librarians for their expanded tasks, this transformation necessitates continual training and professional growth. It is quite difficult to navigate this change while upholding the fundamental principles of librarianship.
- Data Security and Privacy Issues: As libraries increasingly utilize digital technologies and resources, they encounter heightened concerns regarding information security and privacy. A

careful balance must be struck between protecting customer data and facilitating easy access to digital resources. To maintain the confidence and trust of their patrons, libraries must negotiate the difficulties of cybersecurity, privacy legislation, and ethical issues.

- Technical Infrastructure: A strong technical infrastructure is required for the incorporation of digital materials and cutting-edge technology into library services. However, obtaining and maintaining the required equipment presents difficulties for many libraries, particularly those with low funding. Delivering smooth digital experiences and services requires enough hardware, software, & network capabilities, which makes technological advancements a never-ending task.
- Equity and Access: While libraries' digital transformation brings many positive effects, it also exacerbates issues related to equity and access. Not every community has equal access to modern technologies, fast internet, or even standard library services. Closing the digital divide and ensuring that libraries remain accessible to all members of the community, regardless of their socioeconomic background or geographic location, is an extremely challenging task.
- Adapting to Societal Changes: Because libraries are woven into society, they must change to meet evolving standards as society does. It might be difficult to remain inclusive and relevant while serving a diverse and changing population. To continue being relevant to the communities they serve, libraries must manage changing cultural landscapes, demographic shifts, and rising socioeconomic requirements. A methodical and comprehensive approach is necessary to overcome these obstacles. To obtain the funds they require, libraries must prioritize continuing professional development for their staff, put strong privacy and security measures in place, make investments in technology infrastructure, and embrace inclusive policies that guarantee fair access for everyone. If these obstacles are effectively overcome, libraries will be able to flourish as vital and dynamic organizations meeting the changing requirements of their communities, in addition to surviving hardship.

6. DISCUSSION

Traditional functional categories, which are thought to be unable to account for the specificities and wholeness of ways to foster innovation in libraries, are broken by several typologies put out in librarianship. To theoretically underpin this professional literature, this essay attempts to mobilize theoretical notions established in management and service economics. This review of the literature looks at new services and technologies in university libraries, with a focus on four themes: librarians' attitudes toward technology, staff compatibility, and obstacles to its adoption. Web-OPAC, library websites, digital repositories, automation software, social media, mobile apps, e-readers, RFID, barcodes, quick response codes, digital printing, websites using web 2.0 and 3.0 technologies, and more have all been important components of library services within this digital world. To meet the information demands of users, librarians are embracing technology and launching new services and goods. With learning practices impacted by new technology, user needs, evolving library operations & professional mandates, and staff development and training continue to be crucial pillars of library work. However, the use of technology has brought forth problems for library workers, including non-qualitative staff and financial troubles. In summary, libraries are essential to the development of library services, which is why it is important to comprehend and handle the dynamics of their innovation. This article attempts to unite study areas that have mostly disregarded one another by utilizing theoretical frameworks developed in management and service economics.

7. SUGGESTIONS FOR LIBRARIES TO ENHANCE INNOVATIVE SERVICES

Dr. Latpate Rajendra provided suggestions as well as directions for libraries implementing or improving these services.

- Use a User-Centric Approach: Use a user-centric approach to design and deliver services, including regular needs assessments, community engagement, and feedback to modify services to meet user expectations.
- Utilize Technology: Utilize new technologies to improve library services. This could involve

providing digital materials, interactive tools, and data analytics to tailor suggestions and enhance user experiences.

- Promote Collaboration: Collaborate with community organizations, educational institutions, and stakeholders to broaden service options and audience. Collaborations can result in pooled resources, cooperative programming, and enhanced community engagement.
- Foster Digital Literacy: Provide programs & resources to provide users with the abilities to navigate the digital realm. This can involve workshops, one-on-one training, and online courses to improve digital skills.
- Worker Development: Invest in training and professional development to empower library workers with skills and expertise for new services. Foster a culture that encourages creativity and allows employees to experiment with new ideas.
- Continuous Assessment & Evaluation: Regularly evaluate innovative services' impact and efficacy through feedback, surveys, and data analysis. This will help libraries make educated decisions, identify areas for improvement, and tailor services to customer needs.
- Promote Best Practices: Share success stories, case studies, and best practices to promote knowledge exchange within the library community. Attend conferences, workshops, and online forums to learn and share expertise. 8) Receive funding and resources. Investigate grants, foundations, and partnerships for funding innovative service implementation and sustainability. Promote library budget allocations for technology training & program development. These ideas and guidelines can help libraries adopt or improve innovative services. Consider adapting these guidelines to the unique setting, resources, and user needs of each library.

8. RECOMMENDATIONS

- Develop Technology & Infrastructure: Libraries should spend on the acquisition and upkeep of modern technologies. This may involve obtaining grants, partnering with IT companies, or using local government funds for public services.
- Training and Professional Development: Implement regular educational opportunities for library staff to equip them with skills to efficiently use new technology. This training should include both specific technology and optimizing user engagement and assistance.
- Use User-Centered Design: Libraries should prioritize user-centered design when using technology. User feedback is actively sought and incorporated during service development to ensure that introduced technologies fulfill users' expectations and enhance their experiences.
- Improve Digital Literacy Programs: Libraries can enhance community engagement by providing digital literacy programs. Our initiatives aim to bridge the digital gap, allowing all community members to access and use the library's innovative resources.
- Encourage Partnerships: Libraries should collaborate with other learning institutions and technology suppliers to exchange resources, expertise, and standards of excellence. Collaborative initiatives improve service delivery and enable libraries to apply advanced technologies.
- Raise Awareness and Advocacy: Libraries should raise awareness of their role as innovation leaders in the community. Libraries should be promoted as crucial community resources, highlighting their adaptability and dedication to change.
- Develop Flexible Funding Methods: Libraries can address resource constraints by exploring alternate fundraising options like crowdsourcing, community sponsorships, and combined applications with other groups to fund technical projects.
- Regularly Evaluate and Adapt Services: Libraries should create a mechanism to evaluate the efficiency of their technology services and continuously improve them based on user feedback and technological improvements.

9. CONCLUSION

Viksit Bharat 2047, an Indian government program, aims to build the nation by 2047, 100 years after independence. Comprehensive, sustainable growth across every sector is its goal. Libraries are adopting cutting-edge solutions, including partnerships, AI-powered services, and sustainability projects, in spite of these challenges. Libraries face a complex future

filled with new challenges, trends, and creative solutions. They are changing from being traditional information bases to community centres that provide seminars, talks, and educational activities as they adjust to the digital age. By emphasizing data literacy as well as knowledge skills, libraries are enabling users to assess sources critically and make sense of the tremendous amount of information available. To create immersive learning environments, they are also incorporating augmented and virtual reality technologies. These trends do, however, encounter obstacles such as limited funding, changing librarian responsibilities, privacy and security issues, and the requirement to adjust to shifting social norms. They contribute to the cultural diversity of society, encourage lifelong learning, and cultivate intellectual curiosity in addition to being stewards of the past.

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