

Information Resources Management in the Twenty-First Century: Challenges, Prospects, and the Librarian's Role

Md. Armanul Haque^{1,*}, Md. Ikbal Hossain², Md. Mahbubul Islam¹, Amitav Saha³,
A. K. M. Kanak Pervez⁴, Zihadur Rahman¹, Dil Afroz Bente Aziz¹

¹Department of Information Science and Library Management, University of Rajshahi, Rajshahi, Bangladesh

²Department of Marketing, University of Rajshahi, Rajshahi, Bangladesh

³Department of Management Studies, University of Rajshahi, Rajshahi, Bangladesh

⁴Department of Agronomy and Agricultural Extension, University of Rajshahi, Rajshahi, Bangladesh

Email address:

armanul_haque@ru.ac.bd (Md. Armanul Haque), hmikbal77ru@ru.ac.bd (Md. Ikbal Hossain),
mahbubsmail@gmail.com (Md. Mahbubul Islam), amitav@ru.ac.bd (Amitav Saha), kp@ru.ac.bd (Dr. A. K. M. Kanak Pervez),
zihadurrahman85@gmail.com (Zihadur Rahman), dilafrozasha015@gmail.com (Dil Afroz Bente Aziz)

*Corresponding author

To cite this article:

Md. Armanul Haque, Md. Ikbal Hossain, Md. Mahbubul Islam, Amitav Saha, Dr. A. K. M. Kanak Pervez, Zihadur Rahman, Dil Afroz Bente Aziz. Information Resources Management in the Twenty-First Century: Challenges, Prospects, and the Librarian's Role. *American Journal of Information Science and Technology*. Vol. 7, No. 3, 2023, pp. 122-134. doi: 10.11648/j.ajist.20230703.14

Received: July 7, 2023; **Accepted:** July 22, 2023; **Published:** August 17, 2023

Abstract: This study looks at the problems and possible futures of information resource management (IRM) in libraries in the 21st century, as well as the role of librarians in making sure that library and information resources are used well. This study used a mix of methods, including a thorough literature review, qualitative content analysis, technology trend analysis, and thematic analysis, to give a full picture of IRM in the present day. A qualitative content analysis was done on the literature study results to look at the different ways people see IRM. This meant finding and putting together themes about the role of IRM in making organizations more competitive, improving the way decisions are made and making information management better. Information resources management was searched in Scopus. Only articles were searched and 1085 records were found whereas the word 'information management' is the most relevant item. A thematic analysis was done on the results of the literature study to figure out what the biggest problems are for IRM in the twenty-first century. This meant finding and putting into groups themes about information security, the complexity of information systems, and the management and study of data. The results of the different studies were put together to give a full picture of IRM including its views, prospects, and challenges. The mixed-methods approach used in this study is a thorough and systematic way to learn about how IRM is complicated and has many different parts. Researchers and practitioners who work in this rapidly changing area can learn a lot from the results. Based on what was already known about the problem, the study suggested some potential solutions.

Keywords: Information Resources Management, Challenges and Opportunities, Library, Librarian

1. Introduction

Information Resources Management, often known as IRM, refers to managing information resources to execute agency missions and improve agency performance. This includes reducing the burden of information gathering on the general public. Once standardized and controlled, these resources can be shared and utilized across a whole agency, making them accessible to more than just one user or application at a time.

Information Resource Management (IRM) is a program of activities geared toward the optimal use of information technology inside an organization [1, 2]. These activities are part of an Information Resource Management (IRM) program. These tasks include planning information for the entire corporation worldwide to creating, operating, and maintaining application systems and support for end-user computing. Among these tasks are designing and acquiring computer and communication technologies; selecting, implementing, and

managing information system development methodologies; and re-engineering business systems to integrate information systems into the business. It has been established beyond a reasonable doubt that IRM is necessary [3-5]. Information has evolved into a resource that is highly prized and expensive for businesses. However, according to Gartner Group's research from 1990, many companies cannot benefit from this resource since it is frequently not planned for, poorly defined, and poorly understood. Likely, integrating the data collected by these different platforms is not doable. Information resources refer to information and related resources, such as personnel, equipment, funds, and information technology; Information resources management refers to the process of managing information resources to accomplish agency missions and to improve agency performance, including through the reduction of information collection burdens on the public; One of the foremost authorities on information resource management (IRM), Horton defined a resource management system as all methods and procedures for collecting and processing information on a particular resource (i.e., men, money, machines, or what is germane to our subject here, information itself) and formatting that data in a manner which is useful for management [6]. Information resources management (IRM) is a managerial discipline that views information as a resource equal to financial, physical, human, and natural resources, according to Horton's most comprehensive definition in his book *"Information resources management: harnessing information assets for productivity gains in office, factory, and laboratory"* (1985). IRM focuses on handling information resources (raw data) and the generated information assets (knowledge) efficiently and effectively. Knowledge is an essential ingredient in the knowledge society as it is power and brings success. Due to the Information explosion and proliferation of paper and extensive use of information handling technologies, IRM has now become an integral part of the knowledge society. Computers have played a crucial role in the growth of formal information processing in organizations ever since they were first used for administrative information processing in 1954 [7]. The popular perception that information systems (ISS) are a potent tool for organizational issue resolution has been solidly established thanks to the quick growth of information technology [8].

One of the most intriguing and far-reaching ideas to emerge over the last two decades regarding the use of information technology in contemporary companies is the idea of computerized organizations' [9], including libraries and information centres. Modern libraries store books, journals, newspapers, magazines, art reproductions, films, sound and video recordings, maps, pictures, microfiches, microfilms, CD-ROMs, computer software, online databases, and other media. Modern libraries have internet connectivity to distant places and collections. Libraries gather, organize, preserve, and share knowledge. Libraries preserve culture for future generations. This past-present-future connection relies on libraries. Libraries conserve and make accessible cultural records in books and electronic media [10]. A significant quantity of academic literature, including books, theses, journals, reports,

research articles, working papers, etc., has been produced as a consequence of the digital revolution [11-13]. The problems of access and preservation have grown due to the large volume of material now accessible online in digital form [14]. IRM requires skilled librarians to be managed and organized. Proper dissemination of IR to the users depend on the the expert librarians. 21st-centuries library thus require appropriate library professionals to spread information at the right time.

However, the main objectives of this study are to explore IRM in libraries. To know the challenges of IRM in libraries; to understand the prospects of IRM in libraries; to identify the role of the librarian in IRM in libraries; to provide some solutions that can handle the challenges of IRM in libraries based on theories. The study has elements of normative research, along with being both descriptive and suggestive.

2. Literature Review

Librarians and information professionals of the twenty-first century are expected to succeed in the digital world, where they will acquire, apply, use, and integrate new technologies in their company with the help of their newly acquired skills and abilities [15]. The Federal Librarian Competencies (2008) state that competencies can be utilized to create employment advertisements, position descriptions, training and education programmes, and performance assessment programmes. The term "digital competencies" was coined by Ferrari, A. [16], and it refers to the set of knowledge, skills, and attitudes (including abilities, strategies, values, and awareness) necessary to effectively use ICT and digital media to carry out tasks, solve problems, communicate, and manage information. Library staff need to be proficient in digital communication as this medium is increasingly used to reach out to patrons [17]. Library employees need new digital skills/competencies in many areas, including communication with users, education, and providing services like institutional repositories [18, 19]. Digital skills, as described by Trepanier, D. [20], are the abilities to use digital information systems, such as computer hardware and software, to implement proper security measures and secure digital information. Appropriate digital skills are needed to implement the necessary digital library software, apply OCR, assign metadata, learn how to utilize a scanner for digitization, and create high-quality digital items [21].

Since the advent of the World Wide Web, scholars and practitioners in the library and information science (LIS) have been able to address and resolve many significant problems associated with the description, finding, and accessibility of digital resources. Nonetheless, many new issues develop if libraries' procedures and services are not updated to reflect new technology and best practices. The libraries and their LIS experts quickly solve these issues using state-of-the-art tools, extensive training, and readily available materials. This method ensures that libraries, particularly those in industrialized nations, continue to serve their patrons and be well-liked. On the other hand, libraries

are declining in relevance in less industrialized and developing countries, maybe because they continue to use antiquated LIS methods [22].

The research of Ullah *et al.* shows that to create a dynamic, consumable, and shareable knowledge environment in Pakistan, libraries need to move away from old and constrained solutions and toward more modern information and communication technology (ICT)-enabled, user-friendly, state-of-the-art systems [22]. To unite all involved parties, they must implement social semantic cataloguing. For better knowledge generation, recording, sharing, acquisition, and dissemination, it would be beneficial to establish a library consortium that would link users to local, multilingual, and multicultural resources. The continued selection, preservation, and access to information resources is a significant problem for information organizations in the age of digital material and digital technology. There is an immediate need, however, for librarians to develop new skills linked to digital preservation and to become more knowledgeable about emerging trends in their partnerships with research groups.

The purpose of the study by Dempsey *et al.* is to examine the merits, significance, prerequisites, and difficulties of digital preservation in Jordanian university libraries. Of the 150 library staff members polled at Jordan's ten public institutions, 133 completed surveys (for an analysis rate of 88.6%) met the criteria. The findings show that university libraries in Jordan have a modest understanding of the advantages and significance of digital preservation and its prerequisites and problems. It was clear from this that academic libraries, particularly Jordanian ones, needed to learn more about the benefits of digital preservation if they were to keep their collections accessible for future generations [23].

In the 21st century, libraries and librarians continue to play an important part in the administration of information resources. Libraries are now confronted with new problems and possibilities in the proper management of their information resources as a direct result of the proliferation of digital technology and the internet. The purpose of this study is to investigate the problems, opportunities, and views of information resources management in the digital era. The backdrop of the study focuses on information resources management in libraries and librarians in the 21st century. The purpose of this study is to investigate the ways in which libraries and librarians can adjust to new technologies, shifting user requirements, and developing information landscapes. To prepare for the future of our academic libraries, it must be comprehend the complicated interplay between the libraries' competing yet complementary resources. It will continue to use at least one print and one electronic information system in the 21st century, and the task is to make them operate together. Electronic information is growing alongside hard copy on stores. Thus, library and information professionals must stay current and engage in professional activities outside of the institution [24]. The lightning-fast rate of technological advancement is one of the most significant obstacles that public libraries and librarians must overcome in the 21st century. As a result of the

proliferation of digital technologies, libraries are being forced to come to terms with new information management and delivery formats, platforms, and tools. They are also responsible for addressing concerns regarding the confidentiality and protection of data, the ownership of intellectual property, and access to information. At the same time, libraries and librarians are being presented with new challenges and possibilities in the management of information resources brought on by the digital era. They are able to make advantage of emerging technology to improve the quality of the user experience, expand access to a variety of resources, and strengthen both their services and their operations. They also have the potential to play an important part in advancing digital literacy and ensuring that everyone has equal access to information. The library will remain the center of academic and public information, even though ICT has changed how people get information [25].

The research on information resources management in 21st century libraries and librarians aims to shed light on how libraries and librarians may overcome these obstacles and make the most of these opportunities. The purpose of this research is to give a road map for libraries and librarians to follow in order to achieve success in successfully managing information resources in the digital era by investigating best practises, emerging trends, and creative solutions.

3. Methodology

The majority of the information in this article came from secondary sources, particularly IRM-related papers where possibilities, difficulties, scope, ideas, and guidelines were offered. A search was conducted in Scopus database by the keyword "information resources management". The search was limited to article search only. A total of 1085 documents were found. R software analysed scientific mapping. CitNet Explorer, VOSviewer, SciMAT, and CiteSpace [26] are among the many software programmes that offer bibliometric analysis. R package allows quantitative bibliometric and scientometric research, unlike other tools. In the context of the R programming language, the open-source packages bibliometrix and biblioshiny are utilised. Bibliometrix makes it possible to finish the entirety of the process of analysing scientific publications and processing data. According to Aria and Cuccurullo, biblioshiny is a programme that recreates the fundamental bibliometrix code in the form of an online data analysis platform [27]. Users are given the ability to do relevant bibliometric and visual analysis based on an interactive online interface through the usage of biblioshiny [28]. In addition, for the deep understanding, a thorough search was conducted utilizing Google Scholar, and the banglajol Website. For the deployment of IRM for libraries, those retrieved journal articles, working papers, and books have been examined to evaluate the potential and obstacles of IRM. From June through July 2022, data for this study were gathered and analyzed. The study design includes elements of both descriptive and normative studies. Different approaches to IRM are used to examine the data, draw conclusions, and provide recommendations.

Through biblioshiny, the hot topic of IRM researches have been identified (Figures 1, 2, 3). Figures 1, 2, 3 and 4 show the three field plot, most relevant words, word cloud and tree map respectively. As of the figures and table 1, information management, resources allocation, human resources management, management information systems, information resources management are the significant areas of researches used keywords among 1085 documents.

The strategic planning, organisation, and use of information resources to accomplish organisational goals makes information resource management an essential component of modern organisations. Any data or information used by an organisation to make choices, such as consumer information, financial information, market research, and staff information, may be categorised as an information resource. Organizations use information strategically. Information isn't merely a manufacturing factor. Information facilitates the efficient use of other production components [29]. The high frequency of linked phrases in the table 1 illustrates the significance of efficient information resource management. As an illustration, the phrase "information management" occurred 404 times, but the phrases "information resource management" and "management information systems" showed up 66 and 118 times, respectively. For organisations to succeed and obtain a competitive edge, effective information resource management is essential. Organisations may make better choices, streamline processes, and boost performance by efficiently organising and managing their information resources. The ability for businesses to gain useful insights and trends from their data and information assets is one of the primary advantages of information resource management. Organisations can find patterns and trends that can guide business choices and boost performance by efficiently organising and managing their information resources. Information resource management also assists organizations in ensuring adherence to laws and

standards governing data security and privacy. Organisations may safeguard their sensitive information and stay out of trouble by putting in place effective information management policies and processes. Thus, information resource management is essential to contemporary organisations because it helps them to properly utilise their data and information assets for better decision-making, operational efficiency, and performance. Organisations may invest in information resource management strategies and technologies to gain a competitive edge, maintain regulatory compliance, promote cooperation and knowledge exchange, and better accomplish their objectives. Organization theory and microeconomics have long focused on structuring organizational decision making—where, when, and how to make and integrate collective decisions [30].

Table 1. Most frequent words.

Words	Occurrences
information management	404
resource allocation	181
natural resources management	146
information systems	127
management information systems	118
resource management	108
decision making	78
human resource management	78
knowledge management	78
information science	76
management	72
information technology	69
information resource management	66
information resource	65
geographic information systems	63
information use	62
article	61
information services	52

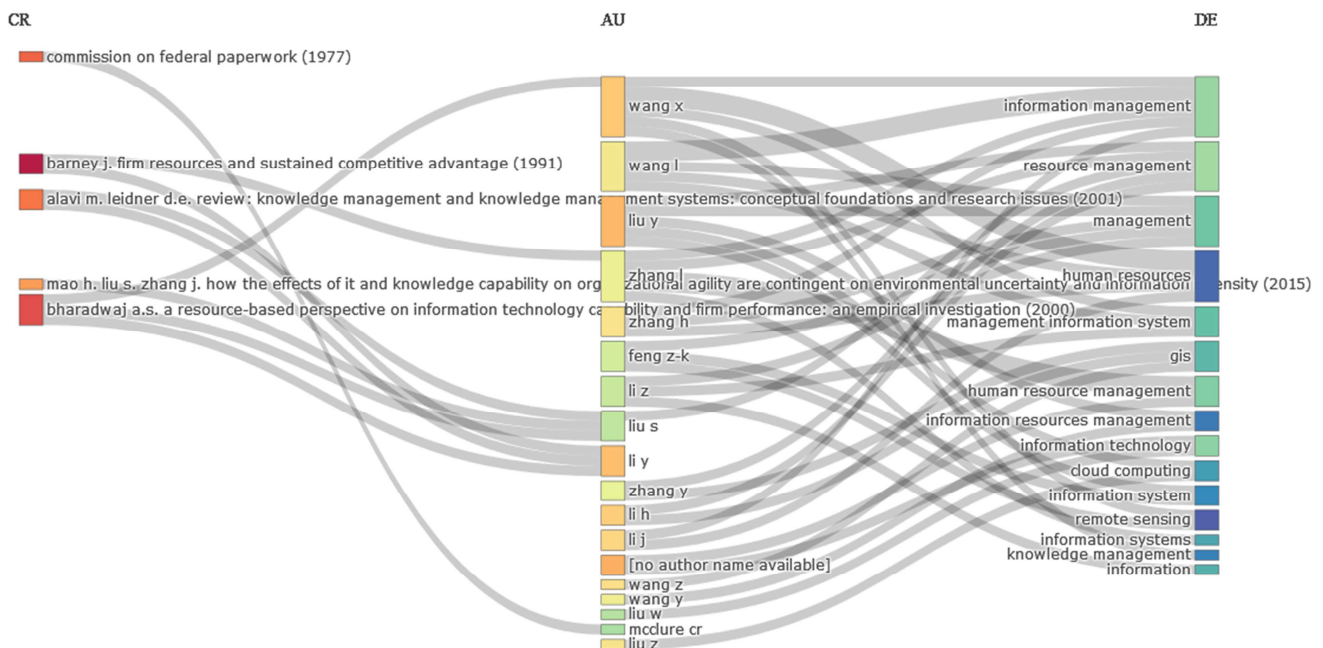


Figure 1. Three field plot.

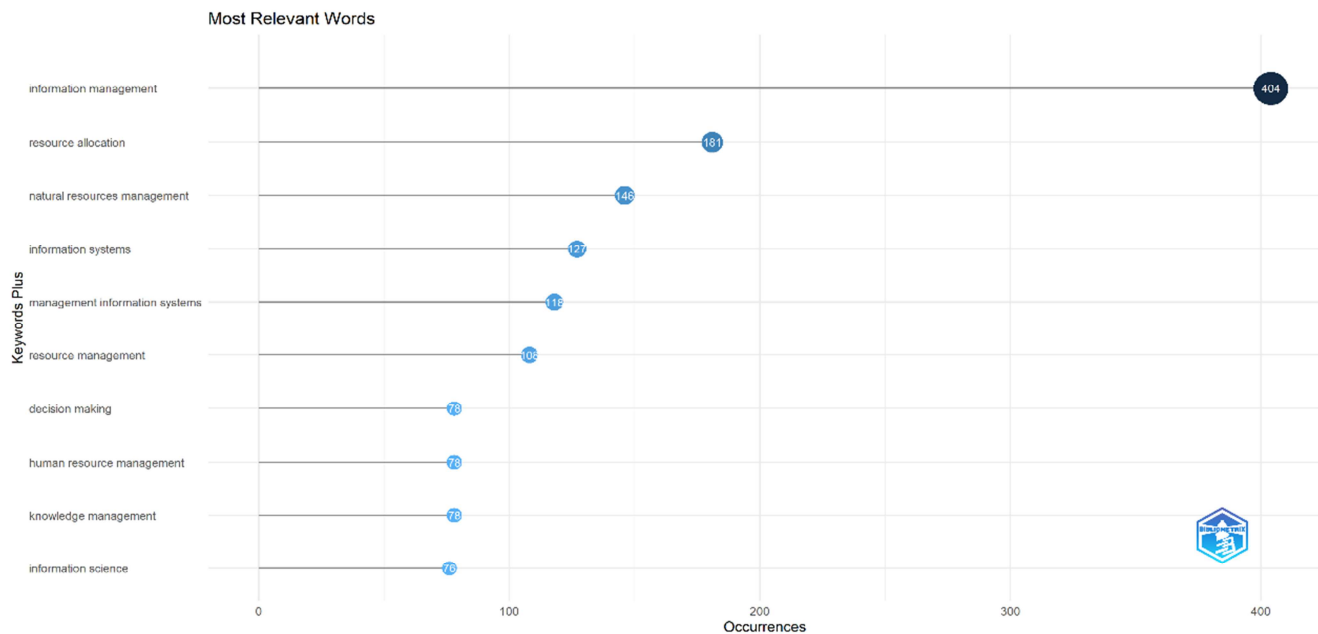


Figure 2. Most relevant words.



Figure 3. Word cloud.

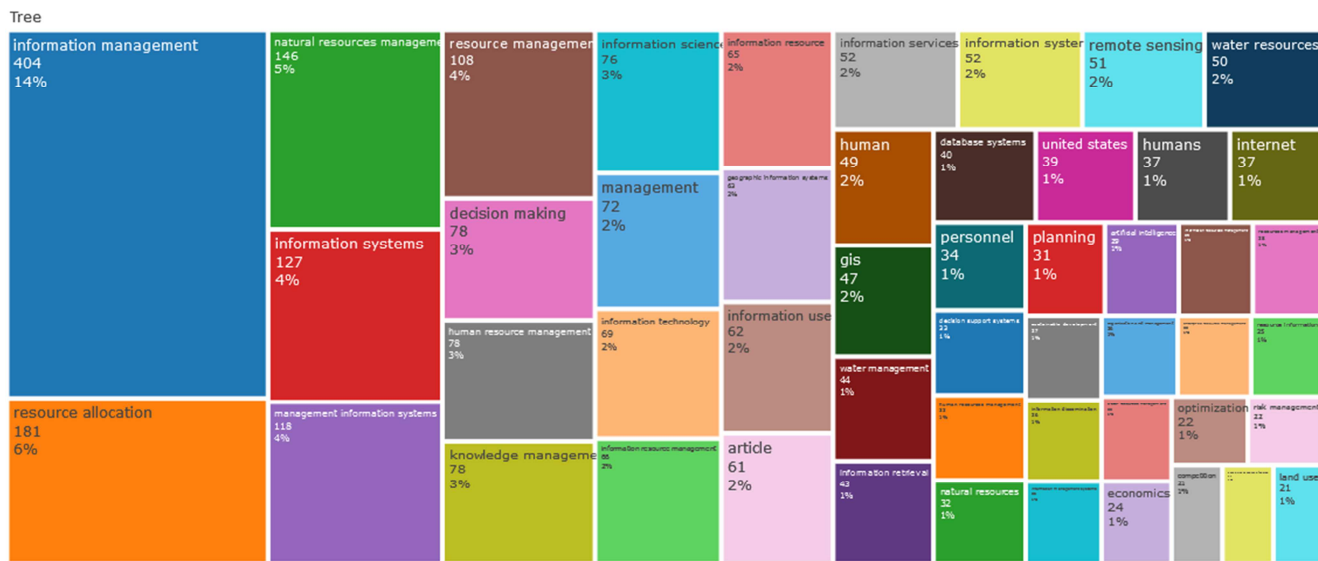


Figure 4. Tree map.

4. Challenges of IRM

During this century, the information management discipline has been subject to two significant paradigm shifts. Both are notable not merely for the considerable change in technological practice they ushered in but, perhaps more crucially, for their ubiquitous cultural impact. Moreover, the second effect has a critical repercussion, which is still impacting today: it has led to widespread occupational obsolescence among far too many members of the professional community. Therefore, it is of the utmost importance and urgency that these two historical events be put into the appropriate context for them to be appreciated for what they are.

Stepping back in time to obtain a broader perspective on computers, in particular, and information management, in general, is vital in any endeavour to get to the principles of the business of managing information. This is true for any attempt to get to the basics of anything. Three phases make up the history of data processing and information management in the modern era. The transition from one to the next was driven partly by technological advancements and, much more significantly, by the influence of human and cultural elements. This interpretation of history appears to explain several events that would otherwise be baffling, particularly the vast range of opinions held within the profession regarding its own purpose, outlook, and manner of operation. Each of these historical epochs can be understood in terms of its own "kingpin" participant, who was the focal point of the majority of attention during that time. According to this classification, they are the clerk (1945), the programmer (1945-1975), and the manager (1975 and after), respectively [4].

The proper acquisition, organization, dissemination, and preservation of information resources in libraries is an essential part of information resources management. These resources include things like books, journals, databases, and other digital assets. Nevertheless, the management of information resources in libraries can present a variety of obstacles. Some of the most significant difficulties are as follows:

Balancing print and digital resources: The management of physical books and other print materials, in addition to the management of digital resources, is required of libraries. E-resources are only useful if you have the right tools to use them, while paper materials are less reliant on technological devices. Because of this, e-resources are becoming more useful as Internet infrastructure gets better. There has been an enormous shift in how people seek over and utilize knowledge [31]. It may be difficult to strike a balance between the storage and accessibility of both formats, given that digital resources call for a technological infrastructure and trained personnel in order to be managed effectively.

Budget constraints: The Internet and low-cost commodities PCs and high-speed networks are altering large-scale parallel and distributed computing [32]. It is common for libraries to have limited finances, which can make it difficult to purchase

and effectively manage a large array of resources. Because of the high cost of accessing scientific journals and other types of materials in today's world, this can be an especially challenging task.

Keeping up with changing user needs: The requirements placed on users are in a state of perpetual flux, and it is imperative that libraries remain current with these requirements. This can be difficult to accomplish because it calls for continuous engagement with users and a comprehension of the ever-changing information requirements of the users [33].

Ensuring the security of information: Information security is becoming a problem because of the spread of information technology around the world in the 21st century [34]. The vast amounts of sensitive material, including personal details and intellectual property, that are stored in libraries come with a corresponding obligation to maintain the highest levels of confidentiality. This can be difficult, as it necessitates the implementation of stringent cybersecurity measures as well as the training of staff members to prevent data breaches.

Managing physical space: Physical resources shift and fluctuate according to physical principles in physical space. Physical frameworks or qualities classify resources. Bookshelves and drawers have been invented to organize and manage physical resources [35]. It is essential for libraries to strike a balance between the requirements for physical space to house books and other resources and the space requirements imposed by patrons. This may prove to be difficult, especially in metropolitan settings where land is at a premium and space is in short supply.

In order to effectively manage information resources in libraries, a mix of technological know-how, financial resources, and an awareness of user requirements are required. In order to overcome these obstacles and give the highest level of service possible to library patrons, librarians and other library staff members need to be well-equipped.

The Center for Business Practices (CBP) produced a benchmark of contemporary business practices in 2009 to address resource levelling. Let's examine these Project Manager challenges in line with library and information centres:

Capacity is the resources to complete a task on schedule and on budget. Resource allocation is impossible without capability estimates. Resource management aids. Libraries evaluate procedure, technology, and unexpected hazards. Resource risks are rarely considered. Project managers should consider all risks and opportunities when allocating resources. The initiative requires skills and resources to benefit the Library and users. Inefficient resource allocation ignores talent. Waste occurs. "Busy work" or low-priority tasks don't satisfy organizational goals. Librarians must detect changes. Project management's "bête noire" is unreasonable timeframes. Teams must consider project and personal/professional resource limits. Risky resource allocation without knowing consumers' needs or company aims. Assess skill set and responsibility demand and capacity

before allocating resources. Connected endeavors differ in importance. Prioritize demand and projects. Complex libraries have unanticipated issues. Problems emerge despite planning and not spreading resources. Before responding, understand demand and demands utilizing project management. Track IRM resource allocation and utilization. Many libraries manually do this on long spreadsheets with human errors. Custom software should track resource allocation and utilization in a project management-mature library. Tool-gathered data decreases portfolio management errors. Projects share resources. Shared resources move projects randomly. Resource management concerns all libraries. They justify organizational change. Recognizing and responding with proper planning, project management tools, and staff is crucial.

5. Librarian/Information Professionals Role in Managing IRM

Information professionals of the future will have a broad view of their role in business analysis. They will be willing to take the initiative whenever doing so is advantageous to the company. They need to abandon their "service mindset" and be ready to take on active advocacy positions on problems relating to utilizing information resources. This should be the attitude of any manager who is entrusted with the care of a crucial asset for the company. It is undeniably the stance of the personnel executive regarding the administration of human resources, and it is the position of the financial executive regarding the management of the money resources. If information executives are to fulfil their duty as guardians of the information asset, they must not settle for less than what is required of them.

Above all else, future information professionals will clearly understand that one of the purposes of adequate application support is to get the "middlemen," i.e., themselves, out of the act as much as possible and make the client as self-sufficient as possible. This will be a priority for future information professionals. They will neither take a defensive stance toward this tendency nor feel threatened by it; instead, they will capitalize on the prospects for functional growth that this strategy affords. The management of big hardware centres and programmer body shops will not be as important to them as the stewardship of data, which they will view as the proper power basis.

The information professional of the future will have a well-rounded understanding of the technology that is currently accessible across a wide variety of fields and will be able to gain the most significant possible advantage from their picks by exercising discretion and objectivity. These experts will be commercially minded individuals attuned to and sensitive to analysis and technology. They will be an invaluable asset on which the organization's success in every respect depends. The organization's future rests on them. When this happens, and only when this happens, the Information Function will finally mature into a well-

respected, credible, and fully-fledged business function all on its own [4]. Therefore, in the digital age, managing information resources is more crucial than ever. Librarians may demonstrate leadership by utilizing time-tested concepts and modernized abilities to give structured access. Librarians can cover all facets of collection management but should pay close attention to anything novel or unusual from the norm. Along with budget management, collection evaluation and review, collection development policies, library collaboration and networking, selection principles and resources, acquisition, access, and licensing principles, collection evaluation and assessment, and preservation and weeding of library resources are all covered [36].

6. How Is a Librarian Involved in Managing IRM

The current society is steadily evolving towards a knowledge society, where information handling based on ICT will be crucial to managing a country's economy. Libraries are regarded as the guardians of books, knowledge, and information. Researchers, educators, students, administrators, business & industry executives, artisans, farmers, etc., all require information to better prepare themselves for the successful pursuit of their various professions. The information and communication technology (ICT) revolution has radically changed librarianship and library operations. These modifications changed the function of librarians from being bookkeepers to being information solution providers and knowledge managers. The digital revolution has dramatically impacted the expectations of library patrons and librarianship. Electronic resources are crucial in the rapid and accessible transmission of information to a broad audience. They have also come to be regarded as a medium for academic communities to connect and exchange ideas, opinions, research findings, and professional expertise. The conventional, constrained style of teaching and research has also been replaced by an online mode thanks to the digital environment. Because of this, libraries must adapt their service offerings to fit the online environment to remain relevant in society, even though they have always kept up with technological advancements; the current digital age is the finest illustration of this. Managing information resources in the contemporary digital world presents a significant challenge to library professionals and new opportunities to provide better services to their customers. Academics' teaching and research activities have greatly benefited from the accessibility of electronic resources, including institutional repositories (I.R.), digital archives, online databases, etc.

6.1. Special Library Services

Well-established academic libraries must work with faculty members, staff, and students to facilitate the scholarly publication and allow open access repositories for their research results [37]. Many students find reading educational

materials they must utilize for their research challenging. They also frequently find it difficult to discern between facts and views regarding their study. These difficulties are seen in several universities. According to Childress, Mendeley and Zotero tutorials teach students how to utilize citation and research tools, allowing them to arrange their reference citations, save and share their data, and find new opportunities [38]. Libraries increasingly provide training on research tools like Mendeley and Zotero to help students and other academic employees. This discovery aids in the orderly organization of research work for both students and scholars. The library can then install anti-plagiarism software to monitor student research projects and find any plagiarism or work that has been done before. Library professionals have gone above and beyond with advanced technologies to provide the library community with access to the online public access catalogue via mobile-optimized websites, research databases, institutional repositories, and mobile access to eBooks. However, most universities still struggle with this issue.

6.2. Smooth Library Communication

The benefits of electronic communication in e-referencing, for instance, include access to numerous information resources, increased accessibility to electronic resources, social networks, and mobile tools, virtual learning opportunities, and the availability of services via the Internet to users at their point of need. In the Library 3.0 environment, Eysenbach notes a new word called "apomediation" to replace the term "intermediary," i.e., librarians will be on standby while users access information without users travelling through reference librarians. It is projected that Web 3.0 and Web 4.0 will involve users, subject matter experts, and libraries on the federated information networks highway pathways. Library 3.0 and 4.0 can also transform the disorganized informational Web into a logical and practical body of knowledge. Other progressive advancements in Web 3.0 and 4.0 include language technologies, 3D printing, and maker spaces. Another talent librarians will need is engaging publishers, preservation organizations, and other stakeholders to create long-term preservation strategies for digital content [39].

To make this successful endeavour possible, academic libraries are already setting up institutional repositories through Dspace and others. Through the agreement, the library will be able to assess how users can access, retrieve, and utilize the material for research and development.

6.3. In-house Section Management for Traditional Library

There is the acquisition, processing section, circulation section, reference section, newspaper and periodical section, rare book section, current awareness service section, reading room section etc., in the library. First, the librarian will be vital in acquiring the information resources (printed and e-resources) based on the user's suggestions and institutional requirements. Then, the required technical processing tasks, including cataloguing, classification, indexing, and

abstracting, are done to be usable in the library for the clients. The circulation section is responsible for charging and discharging the reading materials, and the central unit is for the user's services. As a library is user-oriented, providing the right books at the right time to the right users is a librarian's core function. In addition, they are managing and ensuring the smooth and proper environment in the reading room section needed to take into account. In addition, the newspaper section allows the users to read daily newspapers, magazines and different journals for the recent trends of society and research.

6.4. Digital Library and E-resources Section Management

The demands of the knowledge society, where organizational knowledge, human knowledge, and other knowledge resources must be managed and shared, must be met by digital libraries. The conventional information resource managers, librarians, have a crucial role in this situation. They are in charge of effectively and efficiently managing information resources. In addition, the management of users, which is the ultimate goal of any knowledge management process, is included in information resources management, which also covers the control of the fundamental infrastructure, underlying technology, standards and protocols, access models, and lastly [40].

The requirements for the correct establishment of the infrastructure, such as the network environment and system requirements, the generation of content, and the storage and retrieval of information (ISR), are the core concern of establishing a digital Library to provide the e-resources facilities among the users. Digital libraries are the point at which many different fields and areas of study come together. These fields and areas include data management, information systems, information retrieval, library sciences, document management, the Web, image processing, artificial intelligence, and human-computer interaction. As a result of these technological incursions, most libraries are transitioning into digital libraries, which offer appropriate assistance in meeting the fundamental objectives of their customers by delivering pertinent information. This is due to the globalization of knowledge, the meaninglessness of territorial boundaries due to advancements in information and communication technology (ICT), and the disappearance of conventional limits of time and geography. A digital library is an electronic library in which users access, store, and disseminate content in a digital format across the library. It is an effort to discuss all of the topics associated with the utilization of digital libraries and digital preservation in libraries using language that is easy to understand [41].

7. Arranging Technical and Collaborative Programs

7.1. Training and Seminar Arrangement

A qualified, competent, and confident workforce helps a

business achieve its goals. All libraries are constantly changing, especially in today's digital information world. Therefore, libraries must be adaptable, dynamic, and continuously developing in their political and economic surroundings. A library's staff must improve their professional and technical abilities to embrace change. There are several reasons for library and information workers to engage in continual professional development (CPD) and for library management to invest in it, including:

7.2. Motivations

Library administrators should have a motivated staff. This is critical to providing excellent service. Staff training can help them perform and fulfil their jobs. Unfortunately, many library personnel don't have the skills to execute their jobs. We must adapt to the ever-changing digital information environment by supporting new software or systems, offering I.T. help to library users, or keeping aware of the accessible digital resources. If library managers don't invest in training and development to meet patrons' shifting needs, they'll have demotivated, disillusioned personnel who lack the skills and confidence to accomplish their jobs.

7.3. Award and Recognition

Few library managers can monetarily reward personnel for exceptional work or go the additional mile due to budget constraints or other reasons. CPD opportunities are another method to recognize and appreciate personnel. A team member may show management or leadership qualities while not needing them. To notice these qualities, invite the person to leadership training. Encourage a library staff member who has demonstrated innovative or creative practice to respond to a call for papers and support their attendance. Staff members gain from speaking (which is good P.R. for your library) and attending conferences.

7.4. Career Progression

There are several roles and positions in library, information, and knowledge work, giving library professionals many employment prospects. Managers must help employees fulfil their potential and get new job opportunities. Strategic employee development may help library leaders manage talent and ambitions. Encourage aspiring managers and leaders to apply for "next" level management positions. Enabling diverse experiences and working conditions might be helpful for library and information workers who don't wish to be managers or leaders. CPD helps do this.

7.5. Teamwork

Teamwork pay attention to team dynamics as well as individual demands. By growing the full team (or department) together, members may tackle "change" together. Or you may wish to build teamwork. "Away days" or team events can help. New teams or when management and leadership teams do leadership development jointly benefit most from

team development [42].

Electronic sources of information have grown in importance as library resources. The OPAC and CD-ROM databases provide access to the library's collection and journal publications in many subject areas. These CD-ROM databases constitute a supplement to the OPAC and are sometimes called an expanded OPAC. If the users can use these tools, the library collection can be exploited to its full potential. This also holds for the readers of other libraries, which explains why the availability of CD-ROM databases led to a sharp rise in interlibrary loan requests.

A training program that is tailored to the requirements of the electronic library has been described in this article. The fact that we are a part of a paradigm shift from traditional library services to information services should have been apparent. These new information services challenge the information expert of the future. Information experts must also make electronic information sources available so consumers can discover pertinent data. Considering this strategy leads to a fresh evaluation of user and information services across the board of library activity [43].

7.6. Training Users of the Library

The library serves the institution's readers and researchers. It's the library's job to ensure that its users' information sources, services, and resources are used effectively. User education is vital for library success. Libraries are concerned primarily with the communications that compose the human record and secondarily with the medium by which messages are sent. Libraries are societal institutions that foster education, research, learning, social solidarity, and humankind's greater ambitions [44]. Fleming described user education as "programs of training, education, and exploration given by libraries to users to help them use information sources and services more effectively, efficiently, and independently" [45]. Thus, arranging regular conferences for library users to use and access information resources more effectively may include ensuring the Information literacy program across the academia [46, 47].

7.7. Library Website Up-to-Date

The management and development of electronic services, library websites, and employees are all handled by a digital library service. It may be roughly characterized as "an information access service in which users ask inquiries using electronic methods, such as email or online forms," [48].

Keeping the Website updated, the library, where possible, use and access to e-resources should be ensured. Posting new arrival on the library home page of the library website. Keep frequently asked questions (FAQ) based on the queries received while providing services to the users. Traditional marketing of new arrival in the library board and digital platform, including digital board/website. The World Wide Web (WWW) and the Internet as new information storage and delivery technologies enable speed and economy. Web

and Internet technology has revolutionized how libraries store, retrieve, and share information. Improved access to distant library collections makes electronic information resources more practical and desirable as more libraries migrate to a digital world [49].

How libraries interact with their patrons and the nature of the service itself, have both altered as a result of the digital revolution. Due to the rising percentage of Internet usage among its stakeholders, professors and students alike, academic libraries must have an online presence. In their eyes, websites for libraries act as digital entrances to the services and resources available there. However, a website for an academic library may perform a wide range of tasks, and their relevance can be ranked in different order of priority. A particular demographic of users—students—view library websites as among the most crucial. We identified five features of the academic library website from the viewpoint of a user-centric approach: (1) encouraging the use of the collection (both online and offline); (2) fostering culture; (3) serving as a portal for finding information on the Web; (4) promoting education; and (5) building the library's online reputation [50].

7.8. Library Services Marketing

"Marketing" refers to the effective accomplishment of organizational goals and purchasing and selling for financial benefit. The term "marketing" now has a broader and deeper meaning, which multiplies the organization's subsequent successes. Libraries and other social service providers are among the institutions that use modern marketing techniques in addition to for-profit businesses. In library services, marketing refers to the proactive, user-focused planning, arranging, disseminating, and managing of information services that assure user happiness while meeting parent

organization goals.

"A library's ability to survive depends, among other things, on how users and budget allocators perceive it. This image should result from the services' efficacy and quality and their capacity to foresee and meet the needs and requirements of both current and future customers. The tool that will allow these library goals to be achieved is marketing" [51]. As the business sector started to grasp the financial possibilities of the information superhighway, there was more competition for libraries [52].

According to many researchers, marketing may help reorganize services in response to user needs, improve information products, and significantly contribute to the achievement of a library's goals [53-58]. Most of the literature in university libraries has concentrated on unique marketing application situations. For example, Helton and Esrock described a project created by the University of Louisville Libraries that focused on using marketing strategies to promote student services knowledge and aid in dispelling preconceived notions and unfavourable stereotypes on campus [59]. According to Allen and Taylor, academic libraries can establish specialized information services for overseas students through marketing tactics [60].

7.9. Multilingual Website and E-Resources

The Library's Website should be designed so that it can be accessed and used by different cultures and languages. In addition, the provision should be ensured to auto-translate the resources within the library website. Moreover, quick and easy to access and download with institutional and authentic users accessibility should be provided to use the library's information resources properly.

Based on the above discussions, the following model can be proposed:

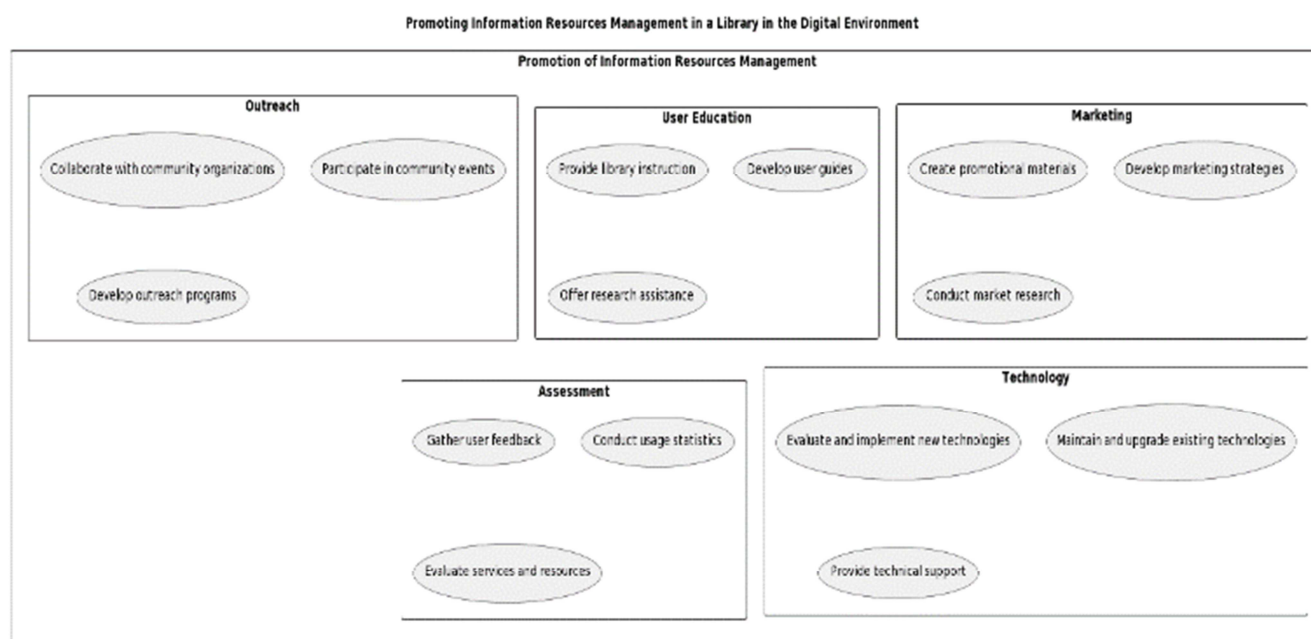


Figure 5. Proposed Model.

8. Conclusion

Effective information resources management requires libraries to understand evolving user needs and expectations. IRM can cover management, education, individual information discipline, and national information discipline. However, IRM has structural and cultural barriers. The paper outlines long-term methods for implementing IRM in libraries and presents a theoretical foundation. The library should invest more money, adopt current technology, build infrastructure, train public officials, and reform administrative procedures to implement IRM properly. Ensuring Smooth library communication, widespread library Services, launching multilingual Website and e-resources, library Services marketing, library Website up-to-date, training users of the library, regular training and seminar arrangement, Digital library and e-resources section management, In house section management for the traditional library, current technology adaptation etc. should be utilized at all levels of library operations for better implementation of IRM in Library and information centres.

As new technologies emerge, library information resources management must be examined. Exploring how libraries might work together and with other institutions like museums and archives may provide new information resources management options. ICT is extensively used in education, especially in poor nations. As ICT, mobile technologies, m-learning, and e-learning create affordable possibilities for developing countries, understanding and supporting distance e-learners in diverse regions will become a growing concern [61]. Libraries may better serve their communities by addressing diversity, fairness, and inclusion in their information resources management practises. The research on information resources management in 21st-century libraries and librarians gives a good beginning place for investigating the problems, possibilities, and views of managing information resources in the digital age. This foundation can be used to overcome literature gaps and constraints in future study.

References

- [1] Fong, E. N., & Goldfine, A. H. (1989). Information management directions: The integration challenge. *NIST Special publication*, 500, 167.
- [2] Diebold, J. (1979). Information resource management-The new challenge.
- [3] Drncker, P. (1988). The Coming of the New Organization. *Harvard Business Review*, 45-53. https://ams-forschungsnetzwerk.at/downloadpub/the_coming-of_the_new_organization.pdf.
- [4] Edelman, F. (1981). The management of information resources-A challenge for American business. *MIS Quarterly*, 17-27. <https://doi.org/10.2307/249155>.
- [5] Synnott, W. (1987). *The Information Weapon*, John Wiley & Sons, New York.
- [6] Horton, F. W. (1979). *Information resources management: Concept and cases*. Association for Systems Management.
- [7] Van Zandt, T. (1999). Decentralized information processing in the theory of organizations. *Contemporary Economic Issues: Economic Behaviour and Design*, 125-160.
- [8] Thonhauser, M., Kreiner, C., & Schmid, M. (2009, April). Interpreting model-based components for information systems. In *2009 16th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems* (pp. 254-261). IEEE. <https://doi.org/10.1109/ECBS.2009.35>.
- [9] Hsu, C., Bouziane, M. H., Rattner, L., & Yee, L. (1991). Information resources management in heterogeneous, distributed environments: A metadatabase approach. *IEEE Transactions on Software Engineering*, 17 (6), 604-625.
- [10] Kademani, B. S., Kalyane, V. L., & Kumar, V. (2003). Preservation of information resources in libraries: new challenges.
- [11] Alam, I. (2014). Changing role of academic librarians in open access environment. International Research: *Journal of Library & Information Science*, 4 (4), 449-457. Retrieved from <http://microblogging.infodocs.eu/wp-content/uploads/2015/12/3-IR239.pdf>
- [12] Kaba, A., & Said, R. (2015). Open access awareness, use, and perception: A case study of AAU faculty members. *New Library World*, 116 (1/2), 94-103. <https://doi.org/10.1108/NLW-05-2014-0053>.
- [13] Van Trier, G. (2009). Focus: Scholarly publishing and open access. *European Review*, 17 (01). <https://doi.org/10.1017/s1062798709000520>.
- [14] Sultan, M., & Rafiq, M. (2021). Open access information resources and university libraries: Analysis of perceived awareness, challenges, and opportunities. *The Journal of Academic Librarianship*, 47 (4), 102367. <https://doi.org/10.1016/j.acalib.2021.102367>.
- [15] Uzohue, C. E., & Yaya, J. A. (2016). Knowledge management competencies required for library and information professionals in 21st century Nigerian libraries. *American Journal of Business and Society*, 1 (3), 90-97.
- [16] Ferrari, A. (2012). Digital competence in practice: An analysis of frameworks. JRC Technical Reports. Institute for Prospective Technological Studies, European Union. <http://www.ifap.ru/library/book522.pdf>.
- [17] Cooper, L. Z. (2014). Electronic portfolios to support the growth of digital identity in the school library. *School Libraries Worldwide*, 20 (2), 1-13. <https://doi.org/10.29173/slw6875>.
- [18] Gregersen, A. (2013). The academic librarians: New roles and challenges: A comparison to Kurt De Belder's "Partners in Knowledge", E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (pp. 2652-2656). Las Vegas, NV: Association for the Advancement of Computing in Education. Retrieved from <https://www.learnlib.org/primary/p/115215/>.
- [19] Joel, A. P., & Ibrahim, F. L. (2021). DIGITAL COMPETENCIES NEEDED BY LIBRARIANS AND INFORMATION PROFESSIONALS FOR KNOWLEDGE MANAGEMENT OF 21ST CENTURY UNIVERSITY LIBRARIES IN BORNO STATE. *Library Philosophy and Practice*, 1-15.

- [20] Trepanier, D. (2012). Define digital skills, available at: www.ymcaimpact.ca/content/definedigitalskills#sthash.usCO WpvO.pdf.
- [21] Raju, J. (2014). Knowledge and skills for the digital era academic library. *The Journal of Academic Librarianship*, 40, 163-170. <https://doi.org/10.1016/j.acalib.2014.02.007>.
- [22] Ullah, I., Khusro, S., & Ullah, A. (2022). Library Management Practices in the Libraries of Pakistan. *Information Technology and Libraries*, 41 (3). <https://doi.org/10.6017/ital.v41i3.14433>.
- [23] Dempsey, L., & Malpas, C. (2018). Academic library futures in a diversified university system. In *Higher education in the era of the fourth industrial revolution* (pp. 65-89). Palgrave Macmillan, Singapore. https://doi.org/10.1007/978-981-13-0194-0_4.
- [24] Gessesse, K. (2000). Collection development and management in the twenty-first century with special reference to academic libraries: an overview. *Library management*, 21 (7), 365-372. <https://doi.org/10.1108/01435120010372551>.
- [25] Fagbola, O., Uzoigwe, C., & Ajegbomogun, V. O. (2011). Libraries driving access to knowledge in the 21st century in developing countries: an overview. *Library philosophy and practice*, 1-7. <https://digitalcommons.unl.edu/libphilprac/566>.
- [26] Chen, C. J., & Hung, S. W. (2010). To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. *Information & management*, 47 (4), 226-236.
- [27] Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of informetrics*, 11 (4), 959-975.
- [28] Mougenot, B., & Doussoulin, J. P. (2022). Conceptual evolution of the bioeconomy: a bibliometric analysis. *Environment, Development and Sustainability*, 24 (1), 1031-1047.
- [29] Choo, C. W. (2002). *Information management for the intelligent organization: the art of scanning the environment*. Information Today, Inc.
- [30] Shrestha, Y. R., Ben-Menahem, S. M., & Von Krogh, G. (2019). Organizational decision-making structures in the age of artificial intelligence. *California Management Review*, 61 (4), 66-83. <https://doi.org/10.1177/0008125619862257>.
- [31] Chandel, A. S., & Saikia, M. (2012). Challenges and opportunities of e-resources. *Annals of Library and Information Studies (ALIS)*, 59 (3). <https://ssrn.com/abstract=3377089>.
- [32] Buyya, R., & Murshed, M. (2002). Gridsim: A toolkit for the modeling and simulation of distributed resource management and scheduling for grid computing. *Concurrency and computation: practice and experience*, 14 (13-15), 1175-1220. <https://doi.org/10.1002/cpe.710>.
- [33] Brewington, B. E., & Cybenko, G. (2000). Keeping up with the changing web. *Computer*, 33 (5), 52-58. <https://doi.org/10.1109/2.841784>.
- [34] Brazevich, D. S., Safronova, Z. S., Kosheleva, T. N., & Biryukova, A. V. (2020). Analysis of the Problems of Ensuring Information Security in the Terms of the Contemporary Society. *Open Journal of Social Sciences*, 8 (02), 231. <https://doi.org/10.4236/jss.2020.82018>.
- [35] Zhuge, H., & Xing, Y. (2011). Probabilistic resource space model for managing resources in cyber-physical society. *IEEE Transactions on Services Computing*, 5 (3), 404-421. <https://doi.org/10.1109/TSC.2011.12>.
- [36] Clayton, P. R., Clayton, P., & Gorman, G. E. (2001). *Managing information resources in libraries: collection management in theory and practice*. London: Library Association Publishing.
- [37] Mikkelsen, S. and McMunn-letangco, E. (2015). Think like a researcher: integrating the research process into the introductory composition curriculum", in Ragains, P. and Sandra, W. M. (Eds), *The New Information Instruction: Best Practices*, Rowman & Littlefield, London, pp. 1-12.
- [38] Childress, D. (2011). Citation tools in academic libraries: Best practices for reference and instruction. *Reference and User Services Quarterly*, 51 (2), 143-152.
- [39] Eysenbach, G. (2008). Medicine 2.0: social networking, collaboration, participation, apomediation, and openness. *Journal of medical Internet research*, 10 (3), e1030. <https://doi.org/10.2196/jmir.1030>.
- [40] Rajendran, V., & Soundararajan, E. (2007). Information Resource Management in a Knowledge Society. *Information Science & Technology (READIT-2007)*, 61.
- [41] Patra, P. S., & Nahak, B. (2014). Planning, designing and developing of digital libraries and digital preservation.
- [42] Appleton, L. (2018). Training and development for librarians: Why bother. *Library Connect. Available at: https://www.elsevier.com/connect/library-connect*.
- [43] Lapp, E. (1996). Information services and user training in the electronic library. *Library Management*, 17 (7), 31-36. <https://doi.org/10.1108/01435129610128359>.
- [44] Gorman, M. (2006). THE WRONG PATH & THE RIGHT PATH: the role of libraries in access to, and preservation of, cultural heritage. *LIBRARIAN*, 28 (28), 87.
- [45] Fleming, H. (Ed.). (1990). *User education in academic libraries*. London: Library Association.
- [46] Nezhad, R. M., & Keshmiri, M. V. P. (2015). The Role of In-Service Training Courses for Librarians' Efficiencies at the Institute for the Intellectual Development of Children and Young Adults (IIDCYA). *Cumhuriyet Üniversitesi Fen Edebiyat Fakültesi Fen Bilimleri Dergisi*, 36 (3), 3658-3669. <https://dergipark.org.tr/en/pub/cumuscij/issue/45132/564707>.
- [47] Suleiman, S. A. (2012). User education programs in academic libraries: the experience of the International Islamic University Malaysia students. *Library Philosophy and Practice*, 139. <http://digitalcommons.unl.edu/libphilprac/774>.
- [48] White, M. D. (2001) Diffusion of an innovation: digital reference service in Carnegie Foundation Master's (Comprehensive) academic institution libraries, *Journal of Academic Librarianship*, 27 (3), 173 - 87. [https://doi.org/10.1016/S0099-1333\(01\)00179-3](https://doi.org/10.1016/S0099-1333(01)00179-3).
- [49] Bhatnagar, A (2005). Web-based library services. 3rd Convention PLANNER -Assam Univ., Silchar.
- [50] Mierzecka, A., & Suminas, A. (2018). Academic library website functions in the context of users' information needs. *Journal of Librarianship and Information Science*, 50 (2), 157-167. <https://doi.org/10.1177/0961000616664401>.

- [51] Narayan, G. J. (1991), *Library and Information management*, New Delhi, Prentice Hall.
- [52] Coffman, S. (1995). Fee-based services and the future of libraries. *Journal of Library Administration*, 20 (3-4), 167-186.
- [53] Wood, E. and Young, V. L. (1988). *Strategic Marketing for Libraries: A Handbook*, Greenwood, New York, NY.
- [54] Bushing, M. C. (1995). The library's product and excellence. *Library Trends*, 43 (3), 384-400.
- [55] Renborg, G. (2000). Marketing library services. How it all began. *IFLA PUBLICATIONS*, 89, 5-11.
- [56] Garusing Arachchige, J. J. (2002). An approach to marketing in special and academic libraries of Sri Lanka: a survey with emphasis on services provided to the clientele.
- [57] ACRL and Reynolds, A. B. (2003). *Strategic marketing for academic and research libraries: participant manual*. ACRL, 3M Library Systems.
- [58] Spalding, H. H., & Wang, J. (2006). The challenges and opportunities of marketing academic libraries in the USA: Experiences of U. S. academic libraries with global application. *Library management*. <https://doi.org/10.1108/01435120610702477>.
- [59] Helton, R. and Esrock, S. (1998). Positioning and marketing academic libraries to students. *Marketing Library Services*, 12 (3). Available at: www.infotoday.com/mls/apr98/howto.html
- [60] Allen, L. E., & Taylor, D. M. (2017). The role of the academic Library Information Specialist (LIS) in teaching and learning in the 21st century. *Information Discovery and Delivery*, 45 (1), 1-9. <https://doi.org/10.1108/IDD-09-2016-0030>.
- [61] Nazari, M., & Webber, S. (2012). Loss of faith in the origins of information literacy in e-environments: Proposal of a holistic approach. *Journal of Librarianship and Information Science*, 44 (2), 97-107. <https://doi.org/10.1177/0961000611436095>.