DIGITAL TRANSFORMATION OF ACADEMIC LIBRARIES IN INDIA: EXPLORING ICT INTEGRATION FOR KNOWLEDGE SHARING AND RESOURCE OPTIMIZATION

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ABSTRACT

The digital transformation of academic libraries has revolutionized knowledge management practices, enabling enhanced knowledge sharing and resource management. This study investigates the role of Information and Communication Technology (ICT) in transforming academic libraries across Indian universities, with a specific focus on its impact on service delivery, knowledge dissemination, and resource optimization. The research explores various ICT applications such as digital repositories, integrated library systems, and collaborative platforms, highlighting their contributions to improving accessibility, efficiency, and user engagement. Despite the evident benefits, the study identifies challenges such as financial constraints, technological barriers, and the need for continuous skill development among library staff. Employing a mixed-methods approach, data was collected from selected university libraries in Jabalpur, Madhya Pradesh, using questionnaires and interviews. The findings reveal a significant adoption of ICT tools, with over 63% of participants acknowledging high standards of ICT-based knowledge management practices. This research underscores the importance of sustained investment in ICT infrastructure, enhanced training programs, and strategic policy development to overcome challenges and maximize the potential of ICT in academic libraries. By tending to these dimensions, libraries can cultivate an innovative and collaborative knowledge ecosystem that can help advance the academic achievement and research productivity of their institutions.

Keywords: Academic Libraries, Information and Communication Technology (ICT), Knowledge Management, Resource Optimization, Digital Transformation

1. INTRODUCTION

University libraries in the modern digital era have a critical role to play in utilizing Information and Communication Technology (ICT) to transform Knowledge Management (KM) practices. The shift from conventional library systems to ICT-driven environments has changed how information is selected, retrieved, and used. Knowledge Management (KM) in libraries involves an organized process of generating, sharing, using, and managing organizational knowledge and information. Excellent KM practices are essential for libraries to facilitate academic research and learning, provide uninterrupted access to information, and develop a cooperative and innovative learning environment.

University libraries, hitherto referred to as knowledge repositories with vast books, journals, and other study materials collections, have considerably developed with the introduction of ICT. Digital libraries, electronic databases, online catalogues, and collaborative tools have transformed KM by providing effective knowledge generation, storage, and retrieval. Library operations have been reformed using ICT applications with much easier accessibility, efficiency, and user participation. Technology like digital repositories, integrated library systems (ILS), and collaborative platforms

makes KM best practices possible. For example, digital repositories make systematic storage and retrieval of scholarly resources possible, preserving them over the long term and making them accessible. Collaborative platforms like wikis and forums encourage sharing knowledge and communication among library users and employees, building a culture of innovation and collaboration. Moreover, data analysis tools give insight into resource usage and user behavior, enabling libraries to make informed decisions and align services to address user requirements.

In spite of these developments, the application of ICT in KM practices is not without challenges. Among these are technology limitations, budgetary constraints, and ongoing training and capacity development of library professionals. Libraries constantly need to upgrade their technological systems, which involves significant amounts of capital outlay and technical know-how. In addition, data privacy and security are always a top concern in the digital space, with strong protection of sensitive information being needed.

This study investigates the different ICT applications that are used in university libraries to support KM practices. It seeks to evaluate the effectiveness of the applications, determine what challenges were encountered during implementation, and recommend successful strategies for harnessing the use of ICT in KM. Through analysis of the recent developments and trends, this research presents an overall overview of ICT applications' impact on KM practices within university libraries, noting their advantages, disadvantages, and opportunities for future. Through continued investment, policy formulation, and emphasis on user participation, university libraries have the ability to utilize ICT in creating an innovative and collaborative knowledge space, ultimately leading to academic achievement and research output.

2. LITERATURE REVIEW

Jena, S.K. (2023). This study focuses on digital education, which is an interdisciplinary topic that covers online learning and other ICT applications. The Education Technology (EdTech) industry had substantial development, receiving $1.8 billion in funding and investment between 2014 and 2019. Online certificates and testing are key growing areas. The article focuses on India's educational technology development and financial growth, emphasizing its potential to contribute to a Digital and Knowledge Economy.

Onyancha, O. B., and Ocholla, D. N. (2022) investigate the use of information and communication technologies in information and knowledge management, revealing their primary applications in medicine, business, education, and industrial management, implying that Bradford's law may not accurately reflect its principles.

Endouware, C. B.-E., and Omehia, A. E. (2022) conducted a study to measure ICT capabilities among 72 librarians from four university libraries in Bayelsa State, Nigeria. The majority had a basic understanding of ICT competences such as word processing, data storage, retrieval, and library operations. However, they had limited knowledge of operating systems and applications. The report recommends enhancing in-house training, raising awareness of ICT competencies, and purchasing new ICT tools to better satisfy users' information demands in the digital age.

Dewah, P., and Sibanda, F. (2022) investigate the use of Information and Communication Technologies (ICTs) in knowledge management by academics at the National University of Science and Technology. It discovered that inadequate IT resources had hampered knowledge management. NUST supplies desktop computers and laptops upon request, but mistrust and bureaucracy impede instructors' knowledge management. The report suggests proper provision of technology, such as laptop computers, to foster knowledge sharing.

Dong, Y., and Huo, Y. (2022). The paper investigates improving electronic information consumption in university libraries, finding value and addressing barriers. It presents optimization ways to improve resource use, promote better information interchange, and foster academic community development.

Tekle, K. (2024), the study looks into how knowledge management techniques might help Ethiopia's leather industry become more innovative and competitive. Effective strategies including knowledge transfer, exchange, and utilization may leverage intellectual capital, promoting innovation and boosting competitiveness, according to research conducted using a desk methodology. In order to promote knowledge management efforts and industry innovation, the research suggests that organizations fund capacity-building activities and create laws.

Knowledge management (KM) models in university libraries are examined in Mostofa, S. M. (2024), which emphasizes the advantages of these models for creating service value. It highlights that for implementation to be successful, a trained workforce and other competencies are required.

The adoption of knowledge management strategies in university libraries is evaluated in this study by Fakandu, A. M., and Yabagi, A. (2023), which focuses on the scope of ICT application and the value of ICT facilities. 393 librarians participated in the study, and data was gathered via questionnaires. The results show that librarians frequently use ICT for normal library operations and knowledge exchange. The report suggests increasing library funding in order to implement the IT literacy resources that are required. Mageswari, S.D.U.(2023) this research examines despite economic development and innovation, India's manufacturing industry has productivity and skilled labor shortages. ICT tools, particularly knowledge management, have a direct impact on both innovation and organizational success.

3. SCOPE OF THE STUDY

This study focuses on how ICT applications enhance knowledge management practices in university libraries located in Jabalpur, Madhya Pradesh. The research targets libraries that have been operational for at least ten years and are accredited by the University Grants Commission (UGC). Four universities were selected for this study, representing diverse fields of education:

1) **Rani Durgawati University:** Focused on higher education.
2) **Dharmashastra National Law University:** Specializing in legal education.
3) **Jawahar Lal Nehru Krishi University:** Dedicated to agricultural education.
4) **Nanaji Deshmukh Veterinary Science University:** Concentrating on veterinary science education.

The development of these libraries is closely tied to the growth and progress of their respective universities. Each library serves as a central hub for academic support, providing vital resources for teaching and learning activities. By examining these universities, the study aims to understand how ICT tools are integrated into library operations to improve knowledge management.

Furthermore, this research highlights the role of libraries in supporting their parent institutions' academic and research goals while addressing the challenges faced in ICT adoption. The insights gained will contribute to developing strategies for optimizing ICT use in similar academic environments, ensuring better service delivery and resource management in the future.

Sr. No.	University Name	Establish Year	Address
1	Rani Durgawati University	1956	Pachpedi, Jabalpur
2	Jawahar Lal Nehru Krishi University	1964	Krishi Nagar, Jabalpur
3	Nanaji Deshmukh Veterinary Science University	2009	Civil Lines, Jabalpur
4	Dharmashastra National Law University	2018	Civil Lines, Jabalpur

4. STATEMENT OF THE PROBLEM

University libraries in Madhya Pradesh are facing a series of knowledge acquisition challenges ranging from poor mobility of labour, lack of mentorship services, inadequate training, conferences/seminars, and the application of ICT facilities and tools among others as shown in the background which is likely to impact on library professional development and henceforth affecting their performance.

4.1. OBJECTIVES

The primary objectives of this research are-

1) To explore the various ICT applications utilized in university libraries for enhancing knowledge management practices.
2) To assess the impact of ICT integration on knowledge creation, sharing, storage, and retrieval in selected university libraries.
3) To identify the challenges faced in implementing ICT for knowledge management and propose strategies for effective utilization of ICT in university libraries.

5. RESEARCH METHODOLOGY

This research employed a mixed-methods design to evaluate the effect of Information and Communication Technology (ICT) on knowledge management in four university libraries in Jabalpur, Madhya Pradesh. The population was library heads, staff, and users. The data collection was done using structured questionnaires and semi-structured interviews. 292 questionnaires were distributed and 183 valid responses were received. Descriptive statistics were employed to study the data, and thematic analysis was employed to obtain detailed views. A rating scale was employed to gauge the utility of ICT tools in reinforcing knowledge management practices.

6. DATA ANALYSIS

The library staff work together to cover the needs of its patrons. Library human resources function at different levels, which are determined by the professional qualifications of the employed and the type of their activities. The table below indicates the number of distributed questionnaires and returned questionnaires and their basic percentage in the chosen university libraries functioning with ICT-based knowledge management.

Table 1 Response rate of university library users

S. No.	College Name	Copies of the questionnaire distributed	Copies of the questionnaire received	Total Percentage (%)
1.	Rani Durgawati University Library	85	62	72.94 %
2.	Jawahar Lal Nehru Krishi University Library	80	53	66.25 %
3.	Nanaji Deshmukh Veterinary Science University Library	65	41	63.07 %
4	Dharmashastra National Law University Library	60	27	51.66 %
	Total	**292**	**183**	**62.67** %

A rating system consisting of four categories very high, high, low, and very low—was used to gauge the degree of knowledge management practice at a few university libraries. According to the results, a significant proportion of the participants, specifically 53 (29%) said that their university libraries have high standards for knowledge management techniques. According to 62 (34%) of the respondents, their libraries have very high levels of knowledge management procedures. Only 41 (22%) and 27 (15%) of the respondents concurred that the degree of knowledge management methods is poor. Since 63% of respondents responded that university libraries in question had high standards for knowledge management, this suggests that these libraries are using these methods. The results of the knowledge management level study at a chosen university libraries are summarized in Figure 1.
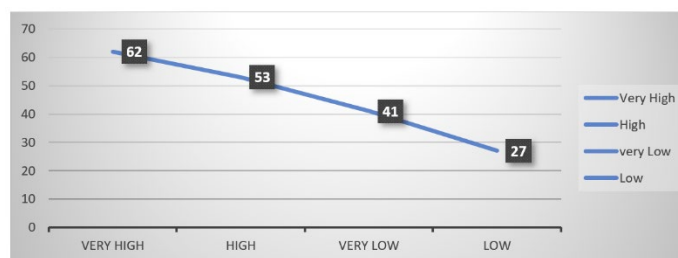

Figure1 Source: Author

When done correctly, knowledge management is seen to be advantageous. The study's findings suggested that because there is a high level of practice, KM can be implemented. The preceding findings indicate that various forms of information services can be successful. The study aims to assess how information sharing improves the quality of services provided by Madhya Pradesh University Libraries. To assess the success of ICT use in knowledge management, extensive practice is required. The study's findings suggested that knowledge management may be implemented due to the high level of practice. With the aforementioned findings, information services might be effective in several forms.

To assess the use of ICT in knowledge management, respondents were asked to rate how much they use computers for library duties, how frequently they use ICT facilities for knowledge management practices, and how important it is to use ICT facilities for knowledge management practices in the library. To determine how much ICT is being utilized to improve knowledge management procedures, respondents were asked to rate the use of ICT using the following categories: strongly disagree, agree, disagree, or agree.

Table 2 How much ICT is being used to improve knowledge management procedures?

The percentage of responders confirms the amount of ICT application in knowledge management.

Variables	Strongly Agree (Freq.%)	Agree (Freq.%)	Strongly Disagree (Freq.%)	Disagree (Freq.%)	Percentage
ICT Applications in Knowledge Management (Independent Variable)	53(29%)	89(49%)	13(7%)	28(15%)	183(100%)
Knowledge Management Activities (Dependent Variable)	55(30%)	92(50%)	9(5%)	27(15%)	183(100%)
Challenges in ICT Implementation (Moderating Variable)	62(34%)	95(52%)	7(4%)	19(10%)	183(100%)
Strategies for Effective ICT Utilization (Mediating Variable)	57(31%)	93(51%)	11(6%)	22(12%)	183(100%)

Source Research data 2024

Regarding knowledge output communication among librarians via ICT, the study's findings show that 53 (29%) highly agreed, 89 (49%) agreed, 28 (15%) disagreed, and fifteen (7%) severely disagreed with the conclusions. Therefore, putting knowledge management ideas into practice at the university library can facilitate the use of information communication technology resources for the distribution of knowledge findings. Thus, knowledge management techniques at university libraries can facilitate the transmission of knowledge outputs concluded by the use of ICT. This result corroborated the verdicts of study, Combining Information Transfer with Information Storage: A Holistic Approach, which found that Web-based technology, is an effective means of communication and knowledge transmission among individuals within an organization from several fields. The same technology is applied to store knowledge from several sources; when utilizing ICT to share knowledge among library workers, KM practice adoption might occur. When asked whether Libraries provide a knowledge repository via which librarians can use information communication technology to access pertinent sources of information., the following results were obtained: 55(30%) respondents strongly agreed; 92(50%) respondents agreed; 27(15%) respondents disagreed; and only 9(5%) respondents strongly disagreed that libraries offer a knowledge store through which librarians can use ICT to access pertinent sources of information.

The chosen university library can embrace techniques for knowledge management since the research demonstrates the expertise of library reservoirs from which librarians can retrieve pertinent sources of information via ICT. Libraries can now clearly see the institutional repository thanks to ICT. Knowledge can be retrieved and organized from the repository using the same ICT. To implement knowledge management, university libraries must first meet certain information and communication technology standards. The results for whether the library invested a lot of money in IT literacy show that 62 (34%) respondents highly agreed, 95 (52%) respondents agreed, 19 (10%) respondents disagreed, and just 7 (4%) strongly disagreed. The vast majority of interviewees reported that federal university libraries have significantly improved IT literacy. This is a good argument for improving knowledge management in academic libraries. This research discovered that libraries that invest in information technology are more likely to successfully implement knowledge management systems. IT resources as well as human instruction in IT are essential to support knowledge management practices in university libraries. The results for whether ICTs facilitate capturing, accumulating, and structuring knowledge dissemination and usage show that 93 (51%) respondents agreed, 22 (12%) disagreed, and just 11 (6%) severely disagreed. of the respondents, 57 (31%) expressed strong agreement that ICTs facilitate knowledge capture, acquisition, organization, sharing, dissemination, and utilization. According to 96.5% of respondents, the

majority of federal university libraries employ ICT to help with knowledge collection, organization, sharing, and dissemination. The majority of respondents agreed that ICT is a critical enabler of successful knowledge management, implying that knowledge management adoption is both attainable and facilitated.
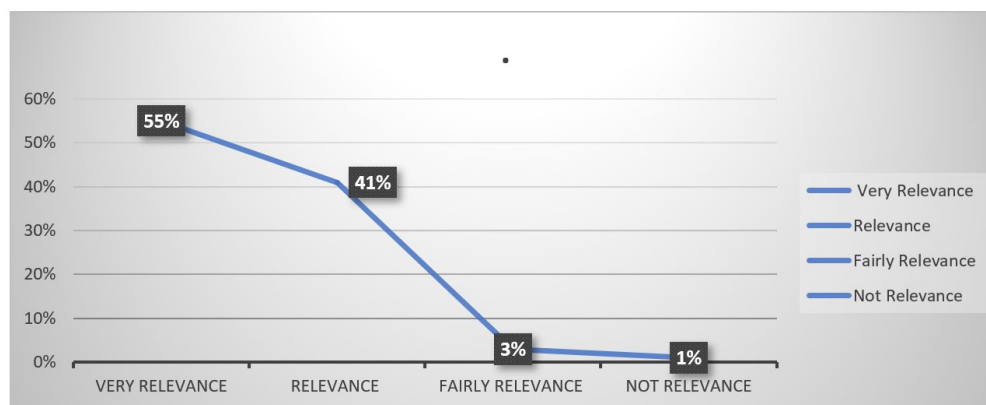

Figure 2 ICT resources' presence in knowledge management techniques

According to the study's findings on the usage of ICT resources in federal university libraries' knowledge management processes, 101 respondents (55%) believe that ICT resources are critical to knowledge management procedures.75 (41%) claimed to be relevant, 5 (3%) claimed to have some relevance, and 2 (1%) stated that the library's knowledge management protocols did not apply to them. Because librarians recognize the value of ICT in knowledge management, knowledge management adoption in the university library would be beneficial. This study's findings are consistent findings on information and communication technology in Madhya Pradesh libraries: Lessons and ideas for improvement, which discovered that information and communication technology (ICT) technologies such as computers, email, databases, phones, search engines, data mining tools, and video conferencing equipment are still required for knowledge management tasks. Figure 2 illustrates the significance that ICT facilities play in knowledge management approaches. According to three university librarians polled, the integration of ICT into library services and facilities is critical to knowledge management implementation. However, one university library claims that its ICT resources require improvement.

7. RESULTS AND DISCUSSION

A total of 292 respondents were selected for the study from the specified university libraries. Out of 292 questionnaires, 183 (62.66%) were filled out and sent back. A total of 62 questionnaires were distributed from the Rani Durgawati University Library, accounting for 72.94% of the responses; 53 questionnaires from the Jawahar Lal Krishi University (JNKV) Library, representing 66.25% of the responses; 41 questionnaires from the Nanaji Deshmukh Veterinary Science University (NDVSU) Library, representing 63.07% of the responses; and 27 questionnaires from the Dharmashastra National Law University (DNLU) Library, representing 51.66% of the responses, were distributed from the library The study involved 292 respondents from the designated university libraries. Out of 292 questionnaires, 183 (62.66%) were completed and received. A total of 62 questionnaires were distributed from the Rani Durgawati University(RDVV) Library, accounting for 72.94% of the responses; 53 questionnaires from the Jawahar Lal Krishi University (JNKV) Library, representing 66.25% of the responses; 41 questionnaires from the Nanaji Deshmukh Veterinary Science University (NDVSU) Library, representing 63.07% of the responses; and 27 questionnaires from the Dharmashastra National Law University (DNLU) Library, representing 51.66% of the responses rate respectively. Table 1 displays the response rates for the selected universities. Questions were addressed to four university librarians in Jabalpur, Madhya Pradesh. The interview had a 100% response rate because all four university librarians participated.

8. FUTURE SCOPE AND RECOMMENDATIONS

Based on the findings of the present study, some future research avenues and practical recommendations can be ascertained for further development of ICT-based knowledge management practices in university libraries:

1) **Future Scope**

Expanded Institutional and Geographic Scope: Future research should involve a more extensive and representative sample, involving universities, public libraries, and special libraries from different geographic regions. This would make the findings more representative and generalizable, offering a comprehensive perspective on ICT's influence on knowledge management.

Long-Term Influence of ICT Implementation: Longitudinal studies can assist in monitoring the long-term influence of ICT implementation on knowledge management practices. These studies would disclose how technologies change, their prolonged influence on library operations, and their ability to adjust to current trends with the passage of time.

Comparative ICT Tools Analysis: Comparative analyses can compare the effectiveness of various ICT tools and platforms, determining the best practices and most effective technologies for knowledge management. This can help libraries make informed ICT adoption decisions.

User-Centered Research: It is essential to study user experience and satisfaction levels with ICT-based systems. Such research would identify user requirements, needs, and preferences and help develop more accessible, friendly, and efficient systems that meet the needs of the students, researchers, and library personnel.

Academic Performance and Productivity: Investigating the immediate effects of ICT-based knowledge management on academic performance, including enhanced student learning, increased research productivity, and institutional achievement, would emphasize the general advantages of ICT use in libraries. This could also assist in supporting investments in ICT infrastructure.

2) **Recommendations**

1) **Developing Digital Literacy Among Users:** Libraries must target developing digital literacy among students and staff through workshops, webinars, and online tutorials. Making users ICT-savvy in utilizing ICT tools and platforms effectively will boost their participation and capacity to derive maximum benefits from library services.

2) **Infrastructure Development:** Universities should prioritize the development and modernization of ICT infrastructure, such as high-speed internet, advanced servers, and digital equipment. This will create a strong technological foundation for implementing effective knowledge management systems.

3) **Open Access Resources and Partnerships:** Libraries ought to embrace and encourage the application of open-access resources and partner with other institutions to share digital content. This would curtail expenses, widen the availability of resources, and foster access to diverse knowledge repositories.

4) **Artificial Intelligence (AI) and Machine Learning Integration:** By using AI and machine learning technologies, the mundane tasks can be automated, resource discovery can be enhanced, and user experience can be customized. AI-based products such as chatbots, recommendation systems, and predictive analytics can revolutionize how libraries handle and share knowledge.

5) **Community Outreach and Awareness Programs:** Libraries must make outreach programs to create awareness regarding ICT-based knowledge management systems' availability and utility. Through interaction with the wider academic community, libraries can make their services more used and collect valuable feedback for enhancement.

9. CONCLUSION

There were information and communication technology (ICT) facilities within the university libraries that were considered. Based on this survey, university libraries make extensive use of information and communication technology (ICT) in performing their routine library functions. ICT was also used by librarians to disseminate knowledge, as noted in this survey. Librarians are able to access relevant sources of knowledge from stores in libraries. According to the findings of this survey, university libraries utilized the ICT facilities that were available to provide a range of services. The integration of ICTs into particular university libraries is a sound idea for the implementation of knowledge management since they enable knowledge management. Although university libraries employ ICT facilities, they have not invested significantly in IT literacy. Since they do not give IT literacy significant priority, this implies that libraries might face difficulties in the future when applying knowledge management. This will lead to poor library services and

tremendous competitive edges over other information providers. By increasing the library budget and allowing the inclusion of information technology literacy resources needed, the university and library administrators should invest considerable money in enhancing IT literacy. This can be achieved by funding conferences, attending seminars, and giving librarians more IT literacy training.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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