AUTOMATION OF INDIGENOUS KNOWLEDGE RESOURCES: CHALLENGES AND OPPORTUNITIES IN LIS

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Abstract :

Indigenous Knowledge Systems (IKS) represent centuries of collective wisdom embedded in oral traditions, cultural practices, and community-based learning. These resources encompass agriculture, medicine, crafts, folklore, and ecological management, yet remain fragile due to globalization, migration, and the dominance of Western knowledge systems. Library automation offers a pathway to preserve, classify, and disseminate IKS in sustainable digital formats. Through digitization, metadata design, multilingual retrieval systems, integrated library software like SOUL 3.0, and digital preservation strategies, libraries can safeguard endangered traditions and democratize access. However, challenges such as linguistic complexity, funding limitations, ethical dilemmas, professional skill gaps, and risks of technological obsolescence complicate this process. At the same time, opportunities for long-term preservation, expanded access, policy alignment, community engagement, interdisciplinary research, and professional growth make automation a vital cultural mission. This paper argues that automating indigenous knowledge resources should be viewed not as a neutral technical act but as a socio-cultural responsibility that bridges tradition and modernity, strengthening the role of libraries in knowledge stewardship.

Keywords : Library Automation, Indigenous Knowledge Systems (IKS), Digital Preservation

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Introduction :

Indigenous Knowledge Systems (IKS) represent far more than accumulated information they are living repositories of experience, cultural wisdom, and practical skills that communities have nurtured over centuries. This knowledge is transmitted through close, sustained interaction with local environments, whether through observing seasonal cycles, managing natural resources, crafting tools, or preparing traditional remedies. Unlike formal scientific knowledge, which is documented, standardized, and disseminated through institutional channels, IKS is often preserved orally, through rituals, apprenticeship, storytelling, and everyday practices embedded in daily life. Its survival depends on social cohesion, intergenerational teaching, and the deep integration of culture with ecology. Each tradition is deeply contextual, reflecting the environmental conditions, societal norms, and collective memory of the community that nurtures it.

Yet, despite its depth and utility, IKS is increasingly vulnerable. Forces such as globalization, urban migration, and the global dominance of Western scientific paradigms threaten its continuity. Younger generations may drift away from traditional practices, elders who hold critical knowledge may pass without passing it on, and oral or material traditions risk fading into obscurity. This erosion is not only cultural but also practical valuable practices in sustainable agriculture, herbal medicine, water conservation, or craft techniques may be irretrievably lost.

In this scenario, libraries traditionally viewed as custodians of documented knowledge emerge as vital agents of preservation. Advances in library automation now allow institutions to go beyond the mere storage of books and manuscripts. They can digitize oral histories, manuscripts, folk songs, rituals, and artifacts, creating structured, accessible repositories. Among these technologies, SOUL 3.0 (Software for University Libraries), developed by INFLIBNET, plays a pivotal role. As a comprehensive integrated library system (ILS), it supports cataloguing, circulation, serial control, acquisitions, and OPAC functionalities. Adapted thoughtfully for IKS, SOUL 3.0 enables precise metadata creation, structured cataloguing, and management of complex, multilingual, and context-specific indigenous resources. Through its deployment, libraries can ensure the long-term preservation of fragile knowledge, provide secure access to global audiences, and bridge the gap between centuries-old traditions and modern information infrastructures.

Conceptual Framework and Tools :

The convergence of Library and Information Science (LIS) and IKS lies in the shared goals of preservation and dissemination. However, unlike conventional texts, indigenous knowledge is embedded in rituals, oral performances, and local practices that resist standardized categorization. Automation in this domain is therefore not merely technical but also socio-cultural.

Core Tools and Technologies for IKS Automation

1. **Integrated Library Systems (ILS) :**

- SOUL 3.0: Designed by INFLIBNET for Indian libraries, it supports cataloguing using MARC21, multilingual OPAC, barcode integration, and digital resource management, making it suitable for handling indigenous collections alongside mainstream resources.
- Koha: An open-source ILS with global acceptance, offering multilingual support, metadata flexibility, and protocol interoperability (e.g., Z39.50, OAI-PMH).

2. **Metadata Standards :** MARC21, Dublin Core, and BIBFRAME are central for bibliographic records, but extensions are needed for contextual, community-driven metadata to capture cultural meaning.

3. **Digital Repositories :** Institutional repositories and digital libraries (e.g., DSpace, Greenstone) can archive manuscripts, oral histories, and images with long-term preservation strategies.

4. **Multilingual Access Systems :** Retrieval interfaces in local and tribal languages ensure inclusivity and cultural accuracy.

5. **Emerging Technologies :** Artificial Intelligence (AI), Big Data analytics, and Cloud Computing support pattern recognition, predictive analysis, and scalable preservation.

Challenges in Automating Indigenous Knowledge Resources :

The automation of Indigenous Knowledge Systems (IKS) is a promising development for both preservation and access. However, the process is layered with complex challenges that extend beyond technology. These challenges can be grouped into five broad categories, each of which highlights the gaps between the nature of indigenous knowledge and the structures of conventional library automation.

1. Linguistic and Structural Complexity :

Indigenous knowledge is inherently multilingual, oral, and context-sensitive. Unlike books or articles that can be easily catalogued by author, title, or subject, much of IKS is transmitted through storytelling, songs, rituals, and communal practices. A medicinal recipe, for instance, may be recited in a local dialect, linked to specific environmental conditions, and carry symbolic meaning that only members of a community fully understand. Conventional metadata standards such as MARC21 or Dublin Core, developed largely within Western bibliographic traditions, are ill-equipped to represent these layers of meaning. Attempting to fit such knowledge into rigid categories risks oversimplification and even distortion. This linguistic and structural mismatch is one of the foremost challenges in automating IKS.

2. Infrastructure and Funding Limitations :

Most repositories of indigenous collections local libraries, cultural centers, or small archives operate under severe financial and infrastructural constraints. Automation demands investments in hardware, software, high-quality scanners, storage systems, trained staff, and reliable internet connectivity. In many rural or resource-poor regions, such facilities are either limited or completely absent. Even when digitization equipment is procured, recurring costs for maintenance, data migration, and cybersecurity remain ongoing burdens. Thus, uneven resource allocation often creates a divide between well-funded urban institutions and marginalized community libraries that are equally rich in indigenous content but lack the means to automate it.

3. Ethical and Legal Sensitivities :

Indigenous knowledge is not just information it is cultural heritage and often sacred. The question of who has the right to record, store, and disseminate such knowledge raises

serious ethical and legal debates. Certain practices or narratives may be meant only for initiated members of a community, while others may be bound by seasonal or ritual restrictions. When libraries automate such materials without adequate community consultation, the result can be misappropriation or cultural commodification. International frameworks like the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) stress the importance of free, prior, and informed consent before digitization, but implementing these principles in practice is complex. Respecting ownership, consent, and cultural sensitivity is therefore a persistent challenge for LIS professionals.

4. Professional Skill Gaps :

Library and Information Science curricula across the world have traditionally emphasized Western cataloguing systems, metadata schemas, and digital infrastructures. While these are valuable, they rarely prepare professionals to deal with the contextual and cultural nuances of indigenous knowledge. Heritage informatics, community-based participatory cataloguing, and multilingual metadata design are often absent from training programs. Moreover, many LIS professionals may not have experience in engaging directly with indigenous knowledge holders, whose collaboration is essential to authentic preservation. Without upskilling and curriculum reform, there will remain a critical gap between professional competencies and the requirements of IKS automation.

5. Risk of Technological Obsolescence :

Paradoxically, while digitization is framed as a solution for preservation, digital materials themselves are highly fragile. File formats evolve, software platforms become obsolete, storage devices deteriorate, and digital repositories require continuous migration. A manuscript preserved on a CD-ROM two decades ago may already be unreadable without specialized equipment. Similarly, metadata stored in outdated systems may be lost during transitions. Without sustainable digital preservation strategies, today's automated repositories of IKS may become tomorrow's inaccessible data dumps. This technological impermanence poses a long-term threat to the very goal of safeguarding indigenous heritage.

Opportunities in LIS for IKS Automation :

While the challenges of automating Indigenous Knowledge Systems (IKS) are real and complex, they are matched by equally significant opportunities. For libraries and the field of Library and Information Science (LIS), automation can create pathways not only for preservation but also for innovation, engagement, and growth. These opportunities extend from technological benefits to cultural revitalization and institutional advancement.

1. Long-Term Digital Preservation :

One of the most immediate opportunities lies in the ability of automation to safeguard fragile cultural resources. Manuscripts written on palm leaves, ritual songs transmitted orally, or craft-making techniques demonstrated only within families are vulnerable to natural decay

and generational loss. By digitizing these materials and storing them in cloud-based repositories with redundant backups, libraries can secure their survival for centuries to come. Unlike physical artifacts that deteriorate, digital objects when properly migrated and maintained can ensure continuity across time. Preservation through automation thus transforms libraries into long-term custodians of cultural memory.

2. Expanded Access and Knowledge Sharing :

Automation opens the door to a broader vision of access. Traditionally, indigenous knowledge has been geographically and linguistically bounded, known only within the communities where it originated. Automated repositories can transcend these limitations, allowing people from across the world to learn from and engage with this knowledge. With multilingual search engines, semantic web technologies, and user-friendly retrieval interfaces, even non-specialists can access cultural materials in meaningful ways. This not only democratizes access but also fosters intercultural dialogue and mutual respect, positioning libraries as mediators of global knowledge sharing.

3. Alignment with National and Global Policies :

Another advantage is that automated IKS repositories align neatly with evolving policy frameworks. In India, the National Education Policy (NEP) 2020 places strong emphasis on integrating cultural heritage into teaching and research, promoting a more holistic and inclusive model of education. On the global stage, UNESCO's initiatives on safeguarding intangible cultural heritage resonate with similar objectives. Libraries that embrace automation of indigenous knowledge thus contribute directly to both national goals and international agendas. This alignment positions LIS institutions as strategic players in cultural policy and education reform.

4. Community Engagement :

Far from being a purely technical exercise, automation can be designed as a participatory process. Communities are not passive providers of knowledge but active stakeholders in deciding how it is documented, described, and shared. Libraries can develop digital platforms where indigenous members contribute metadata, validate entries, and determine levels of access for sensitive materials. This participatory model ensures not only greater authenticity and accuracy but also fosters trust between libraries and the communities they serve. In this sense, automation strengthens the social role of libraries as facilitators of dialogue and empowerment.

5. Interdisciplinary Research Potential :

Once indigenous knowledge is digitized and made accessible, it can fuel new avenues of research across disciplines. For example, ethnobotanical data preserved in oral traditions can inspire pharmacological studies; agricultural practices embedded in folklore can inform ecological research; and linguistic diversity captured in songs or proverbs can contribute to

sociolinguistics. Libraries thus evolve into research laboratories, enabling scholars to uncover connections that were previously hidden in dispersed, inaccessible, or non-documented forms of knowledge. This positions LIS not just as a support service but as an active partner in the generation of new knowledge.

6. Professional and Institutional Growth :

Engagement with indigenous knowledge also provides a unique growth opportunity for LIS professionals and institutions. Working with IKS requires skills in digital humanities, archival science, semantic technologies, and heritage informatics, expanding professional expertise beyond conventional cataloguing. Such involvement enhances employability, opens interdisciplinary career paths, and increases the global relevance of library education. For institutions, the integration of IKS automation projects can attract funding, partnerships, and recognition, raising the profile of libraries as leaders in cultural stewardship in the 21st century.

Conclusion :

Automating indigenous knowledge resources is a space where cultural heritage and digital innovation converge. The process is complicated by oral traditions, multilingual diversity, funding shortages, ethical concerns, and the instability of digital technologies. These challenges make it clear that automation cannot be treated as a mere extension of existing library practices; it requires frameworks that respect the distinctive nature of Indigenous Knowledge Systems (IKS).

At the same time, the potential is profound. Automation supports long-term preservation, enhances global access, and strengthens intercultural dialogue. It aligns with policy initiatives such as India's NEP 2020 and UNESCO's cultural programs, while also inviting community participation to safeguard authenticity. For LIS professionals, engaging with IKS offers new opportunities in research, digital stewardship, and interdisciplinary collaboration.

Ultimately, automation should be viewed as a cultural mission rather than a neutral technical act. Libraries thus become not only managers of information but also custodians of living traditions, ensuring that indigenous knowledge is preserved, respected, and made relevant for education, research, and society in the 21st century.

References :

- Choudhury, S., & Singh, S. (2022). Digital preservation of cultural heritage in Indian libraries: Challenges and prospects. *Library Hi Tech*, 40(2), 317–332. https://doi.org/10.1108/LHT-09-2020-0217
- Das, A. K. (2021). Indigenous knowledge systems and digital preservation: The role of libraries in safeguarding cultural memory. *Journal of Documentation*, 77(5), 1043–1062. https://doi.org/10.1108/JD-01-2021-0012

- INFLIBNET. (2020). *SOUL 3.0: Software for University Libraries*. Information and Library Network Centre. https://www.inflibnet.ac.in/soul
- Reddy, P. V., & Kumari, V. (2020). Knowledge management of indigenous resources: Opportunities for LIS professionals in the digital era. *International Journal of Information Management*, 54, 102152. https://doi.org/10.1016/j.ijinfomgt.2020.102152