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Renu V Namboothiri
Research Scholar, Department
of Library, Ganesan College of
Arts and Science, Pudukottai,
Tamil Nadu, India

Dr. A Veni Krishna Bharathi
Assistant Professor / Librarian,
Tamilvel Uma Maheshwaranar
Karanthai Arts College,
Karanthai, Thanjavur, Tamil
Nadu, India

Corresponding Author:
Renu V Namboothiri
Research Scholar, Department
of Library, Ganesan College of
Arts and Science, Pudukottai,
Tamil Nadu, India

CUSAT's digital legacy: Preservation challenges and solutions

Renu V Namboothiri and A Veni Krishna Bharathi

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Abstract

Digital preservation plays a vital role in supporting academic and research excellence in higher education institutions. As universities increasingly depend on digital information for teaching, learning, and research, it has become essential to ensure that these digital materials remain accessible and usable over time. Cochin University of Science and Technology (CUSAT) and its affiliated colleges generate and use a large amount of digital content, including research papers, theses, administrative records, and e-learning materials. However, managing and preserving these resources presents several challenges.

Many colleges affiliated with CUSAT face difficulties such as inadequate infrastructure, lack of trained staff, limited funding, and the absence of clear institutional policies for digital preservation. Issues like data loss, outdated technology, and insufficient backup systems also threaten the long-term safety of digital resources. Furthermore, awareness about the importance of digital preservation among faculty and administrators is often limited, making it harder to adopt effective preservation practices.

Despite these challenges, CUSAT and its affiliated colleges also have several opportunities to strengthen their digital preservation systems. The increasing availability of cloud storage, open-source preservation tools, and government initiatives supporting digital libraries provide a strong foundation for improvement. Collaboration among colleges, training programs for librarians and IT professionals, and the development of a unified digital preservation policy could significantly enhance sustainability and access.

This paper explores the current status of digital preservation in CUSAT-affiliated colleges. It identifies key challenges faced by these institutions and suggests practical strategies to overcome them. The study emphasizes the need for planning, collaboration, and technological innovation to ensure that digital academic resources remain secure, accessible, and useful for future generations. In doing so, it contributes to strengthening the overall academic and research environment of CUSAT and its associated institutions.

Keywords: Digital preservation, sustainability, Cochin University

Introductions

Digital preservation has emerged as a cornerstone of academic and research sustainability in higher education institutions worldwide. It encompasses the processes, policies, and technologies employed to ensure the long-term accessibility and usability of digital content. As institutions increasingly rely on digital resources, the importance of preserving these assets has become paramount. Academic institutions must maintain continuity in research, education, and institutional memory, particularly in the face of technological obsolescence, data corruption, and resource accessibility challenges.

Digital preservation refers to the processes and strategies aimed at maintaining and ensuring long-term access to digital content. In academic institutions, it involves safeguarding critical resources such as research articles, theses, e-books, institutional data, and digital repositories. CUSAT-affiliated colleges, as part of Kerala's academic ecosystem, hold a significant amount of digital data, including student records, research outputs, and electronic learning materials. The preservation of these resources is vital not only for academic continuity but also for the global competitiveness of these institutions. However, several technological, administrative, and infrastructural barriers complicate digital preservation efforts.

In the context of Cochin University of Science and Technology (CUSAT) and its affiliated colleges, digital preservation plays a critical role. CUSAT-affiliated colleges generate and manage substantial amounts of digital data, including theses, e-journals, administrative records, and multimedia teaching resources. However, these institutions face challenges such

as limited infrastructure, inadequate policy frameworks, and insufficient technical expertise. Addressing these issues is vital for ensuring the sustainability of digital assets and their seamless access for future academic endeavors.

Globally, institutions such as the British Library and Harvard University have set benchmarks in digital preservation, using advanced systems for managing and safeguarding digital resources. In India, initiatives like Shodhganga and e-ShodhSindhu have paved the way for centralized access to academic outputs, underscoring the national commitment to digital preservation (INFLIBNET, 2020) ^[3]. Similarly, UNESCO has emphasized the need for robust preservation frameworks in academic institutions, highlighting the risks of data loss and the importance of open standards (UNESCO, 2018) ^[12].

Despite these advancements, the specific needs and challenges of regional institutions like CUSAT-affiliated colleges remain underexplored. This study aims to assess the current state of digital preservation in these colleges, identify gaps, and propose strategies to ensure sustainable access to digital resources. By focusing on the unique context of CUSAT, this research contributes to the broader discourse on digital preservation and its implications for academic excellence and institutional resilience.

2. The Need for Digital Preservation in CUSAT-Affiliated Colleges

2.1 Academic and Research Significance

Digital preservation is critical for sustaining academic excellence and ensuring the longevity of scholarly resources in Cochin University of Science and Technology (CUSAT) and its affiliated colleges. These institutions generate vast amounts of digital content, including research publications, theses, student records, and multimedia teaching materials. Without proper preservation, this valuable data risks obsolescence, corruption, or complete loss due to technological failures or format incompatibilities. Preserving digital resources ensures their accessibility for future research and academic use, contributing to institutional legacy and global visibility. Moreover, it aligns with compliance requirements from bodies like the UGC and supports participation in national initiatives such as Shodhganga. As educational institutions transition to digital ecosystems, robust preservation practices are vital for maintaining data integrity and fostering academic innovation. Addressing this need enhances institutional efficiency, academic collaboration, and resource availability for the next generation of learners and researchers. Digital resources are central to academic and research activities, including teaching, learning, and scholarly communication. Preserving these assets ensures access to:

- Research outputs for future studies.
- Educational materials for academic use.
- Administrative data for institutional management.

2.2 Institutional Legacy

CUSAT: affiliated colleges generate a wealth of scholarly content, including faculty publications and conference proceedings. Effective digital preservation helps maintain institutional legacy and enhances global visibility through initiatives like open-access repositories.

2.3 Legal and Compliance Requirements

Digital preservation aligns closely with mandates from organizations like the University Grants Commission (UGC) and the Information and Library Network Centre (INFLIBNET), both of which emphasize the importance of creating and maintaining institutional repositories for academic outputs. The UGC, through initiatives such as the *UGC (Submission of Metadata and Full-Text of Doctoral Theses in Electronic Format) Regulations, 2009*, mandates that universities submit electronic copies of theses and dissertations to a central repository. This policy aims to ensure long-term access, prevent duplication in research, and facilitate knowledge sharing.

INFLIBNET, as a national organization promoting ICT applications in education, has developed platforms like *Shodhganga* and *Shodhgangotri*. These repositories enable universities to upload theses and research synopses, providing centralized, open-access resources to researchers across the country. By adhering to these mandates, institutions not only contribute to national academic networks but also uphold transparency and accessibility in scholarly communication. Digital preservation practices are essential for meeting these requirements, ensuring that academic contributions are securely archived and accessible in standardized formats for future generations. This alignment reinforces the role of institutions like CUSAT and its affiliated colleges in fostering research excellence and national collaboration.

3. Current State of Digital Preservation in CUSAT-Affiliated Colleges

3.1 Digital Resource Management

The digital preservation practices in Cochin University of Science and Technology (CUSAT)-affiliated colleges exhibit a mix of progress and challenges. Many colleges utilize platforms like INFLIBNET's *Shodhganga* for theses submission, which ensures accessibility and compliance with national standards (Kumar & Lalitha, 2020) ^[4]. However, institutional repositories within these colleges are often underdeveloped, relying on basic technologies such as local storage or outdated systems (Ramesh & Krishna, 2018) ^[9]. Open-source tools like DSpace are used sporadically but lack widespread implementation due to resource and technical constraints (Nair *et al.*, 2021) ^[5].

Limited funding and inadequate IT infrastructure remain significant barriers, hampering efforts to adopt scalable and advanced solutions such as cloud-based storage (Pillai & John, 2019) ^[7]. Furthermore, there is a notable gap in institutional policies, with many colleges lacking a comprehensive digital preservation framework (Rajeev, 2022) ^[8]. The lack of training among staff and limited awareness about preservation best practices further exacerbate the issue (Sundar & Mani, 2020) ^[11]. Despite these challenges, there is a growing recognition of the importance of digital preservation, with initiatives underway to integrate it into administrative and academic workflows.

Most CUSAT: affiliated colleges rely on shared digital repositories for managing research publications and student theses. Tools such as *Shodhganga* and *e-ShodhSindhu* facilitate access to a national network of academic resources.

3.2 Technological Infrastructure

While some colleges use open-source platforms like DSpace for repository management, others rely on external storage services. The lack of advanced technologies, such as cloud storage or automated preservation systems, limits the scope of digital preservation.

3.3 Challenges

Despite efforts, the following challenges hinder digital preservation:

- **Technological Obsolescence:** Rapid changes in technology render storage devices and file formats outdated.
- **Resource Limitations:** Insufficient budgets for IT infrastructure and trained personnel.
- **Policy Gaps:** Absence of a unified preservation policy across CUSAT-affiliated colleges.
- **Awareness and Training:** Limited knowledge among faculty and staff regarding the importance and methodologies of digital preservation.

4. Strategies for Ensuring Access and Sustainability

To address these challenges, the following strategies are recommended:

4.1 Developing Institutional Policies

- Create a comprehensive digital preservation policy aligned with international standards such as the Open Archival Information System (OAIS)^[6].
- Establish clear guidelines for data storage, access, and backup.

4.2 Strengthening Technological Infrastructure

- Adopt cloud-based solutions for scalable and secure data storage.
- Utilize open-source tools like DSpace and Greenstone for institutional repositories.
- Invest in data redundancy mechanisms to prevent loss due to hardware failure.

4.3 Building Human Capacity

- Conduct regular training sessions for faculty and administrative staff on digital preservation technologies and practices.
- Collaborate with organizations like INFLIBNET for technical support and capacity building.

4.4 Promoting Open Access

- Encourage researchers to publish in open-access journals.
- Create institutional repositories to host and share academic outputs globally.

4. Case Studies and Best Practices

5.1 International Benchmarks

- **Harvard University Library:** Uses an automated preservation system to manage its vast digital collections.
- **British Library:** Employs innovative technologies like web archiving and digital curation.

5.2 National Initiatives

- **Shodhganga:** A platform for hosting Indian theses and dissertations, facilitating nationwide access.
- **E-Shodh Sindhu:** Provides subscription-based access to e-resources for academic institutions.

6. The Road Ahead

Digital preservation is a continuous process that demands sustained commitment, innovation, and strategic planning. For CUSAT-affiliated colleges, a multifaceted approach is essential to ensure the long-term accessibility and sustainability of digital resources. Establishing collaborative frameworks with other institutions and digital preservation networks can facilitate the sharing of knowledge and resources, fostering a more robust preservation ecosystem. Enhancing funding opportunities through government schemes, international grants, and partnerships with industry stakeholders is critical for addressing financial constraints and supporting preservation initiatives. Embracing emerging technologies such as blockchain for secure record-keeping and artificial intelligence for automated data curation can significantly improve the efficiency and reliability of preservation efforts. Additionally, the establishment of a dedicated task force to monitor and evaluate preservation activities is vital for identifying gaps, assessing effectiveness, and implementing periodic improvements. Together, these measures can help CUSAT-affiliated colleges overcome challenges and strengthen their digital preservation infrastructure.

7. Conclusion

Digital preservation is very important for maintaining academic excellence, protecting institutional heritage, and improving global visibility for higher education institutions. It ensures that important digital materials such as research papers, administrative records, and learning resources remain safe, accessible, and usable for a long time. In the case of Cochin University of Science and Technology (CUSAT) and its affiliated colleges, digital preservation plays a key role in supporting teaching, learning, and research activities. It helps the institution maintain its legacy while also contributing to global knowledge sharing. In today's knowledge-based world, universities are valued for how well they create, store, and share information. Strong digital preservation practices help CUSAT and its colleges demonstrate their commitment to innovation and knowledge dissemination. However, achieving these goals is not easy. Several challenges limit the effectiveness of digital preservation in higher education, especially in institutions with limited resources.

One major challenge is technological obsolescence. As technology advances rapidly, older digital formats, hardware, and software often become outdated and incompatible with modern systems. When this happens, valuable data and research outputs may become inaccessible or permanently lost. For example, a thesis stored on an old CD or floppy disk may no longer be readable on new computers. This problem highlights the importance of regularly updating and migrating digital content to newer formats and platforms.

Another major issue is resource limitation. Many CUSAT-affiliated colleges face shortages in funding, trained staff,

and infrastructure. Without sufficient investment, it becomes difficult to maintain reliable servers, backup systems, or secure storage facilities. The lack of skilled personnel who understand digital preservation methods further adds to the problem. Without proper guidance and expertise, even well-intentioned preservation efforts may fail to ensure long-term accessibility.

To overcome these challenges, CUSAT and its affiliated colleges need to adopt a strategic and sustainable approach. First, they should develop clear digital preservation policies that follow international standards and best practices. Such policies will guide institutions in storing, managing, and protecting their digital assets. Second, they should invest in modern technologies, such as cloud-based storage and redundant backup systems, to ensure the safety of digital materials. Third, training programs for librarians, IT professionals, and administrative staff are essential to build institutional capacity and awareness.

In addition, emerging technologies offer new opportunities for improving digital preservation. For instance, blockchain technology can be used to verify the authenticity and integrity of digital records, preventing unauthorized changes. Artificial intelligence (AI) can help automate the process of organizing, tagging, and curating large volumes of data. Open-source platforms can provide cost-effective tools for creating and managing institutional repositories.

By adopting these innovative solutions, CUSAT-affiliated colleges can ensure that their digital collections remain secure, organized, and accessible to future generations. Effective digital preservation will not only protect valuable academic outputs but also enhance the reputation of these institutions. It will allow researchers, students, and the global academic community to access and benefit from the university's contributions for years to come. Ultimately, prioritizing digital preservation strengthens CUSAT's identity as a forward-looking, knowledge-driven institution committed to academic excellence and sustainability.

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