Comparative Analysis of Digitisation and Digital Preservation Efforts in Libraries of Autonomous Institutions and Private Universities in Bengaluru

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Abstract

This research examines and compares the status of digitisation efforts in academic libraries of autonomous institutions and private universities in Bengaluru, investigating the circumstances and obstacles faced in effective information dissemination and technological considerations. A sample of 22 libraries, including 11 from private universities and 11 from autonomous colleges, was studied through questionnaires distributed to their librarians. Findings reveal that all surveyed libraries (100%) have digitisation and digital preservation policies in place, with 73.69% using DSpace software and 84.2% having librarians oversee digitisation initiatives. The study is limited to libraries in Bengaluru and highlights that university libraries are more engaged in digitisation compared to college libraries. It emphasises the need for significant contributions from stakeholders, including decision-makers, librarians, and information professionals, to continue and advance digitisation efforts. Furthermore, it stresses the importance of developing comprehensive library collections and establishing effective digital library systems to support ongoing digitisation initiatives.

Keywords: Autonomous college libraries, Digitisation, Digital libraries, Digital preservation, Private universities, Remote access

1.   Introduction

Academic libraries are essential repositories of knowledge vital for navigating today's information landscape. The integration of information and communication technology (ICT) has significantly transformed library services, supporting educational, research, and learning activities in the information society. Libraries have swiftly adapted to meet the growing demand for immediate access to information. Preservation specialists in cultural heritage sectors, including libraries and archives, have long explored digitisation technologies to safeguard digital information against physical damage and obsolescence (Conway, 2010). Digitisation involves converting analogue materials like books, audio files, images, and videos into digital formats, enabling access, storage, and manipulation via electronic devices (Buenger, 2008).

In computing, bits serve as fundamental units of information, mirroring traditional analog preservation concepts (Caplan, 2008). Digitisation enhances visibility of previously inaccessible information, facilitating simultaneous access by multiple users

(Angadi, 2021). Digital preservation techniques like reformatting, data migration, emulation, and metadata attachment ensure ongoing access to digital materials (Arora, 2006). The overarching goal of digital preservation is to certify the authenticity, reliability, and accessibility of digital heritage and knowledge for future generations. By employing these strategies, libraries and cultural institutions continue to adapt and innovate in preserving digital resources amidst the evolving technological landscape.

2.   Review of literature

Nawaz (2024) conducted a study that revealed that the process of converting physical archives into digital formats is essential for the preservation, distribution, and accessibility of historical data. The study focused on the digitisation of the oldest archives in Punjab, encompassing 114,592 records selected for initial digitisation. Oguntoye (2024) emphasised the increasing responsibility of libraries in the 21st century to adopt digital preservation practices. This research explores the influence of institutional support and digital proficiency on preservation and conservation practices among library staff. It suggests that academic institutions should prioritise both digital and physical resource conservation and preservation equally. Shantha (2023) noted that institutions are initiating the digitalisation process for reasons such as content preservation (97%) and providing web access to content (84%) for numerous users. The study found that 60% of surveyed libraries digitise less than 25% of their materials annually, 30% digitise less than 50%, and 10% digitise less than 75%. Bakhshi (2016) examined the preservation strategies employed by the IGNCA center, particularly focusing on the digital preservation of cultural heritage artifacts. A case study approach was used to investigate the center's digitisation efforts. Dadzie and Walt (2015)

investigated strategic policies for enhancing digital libraries in Ghanaian universities. Through interviews with three university librarians, the study explored perspectives on planning and financial allocation for digitisation. Findings indicated that KNUST and UCC libraries have policies related to digitisation events, including IR and ICT policies. Amrohi and Chauhan (2014) highlighted the challenges faced by library professionals in preserving digital materials and recommended maintaining relative humidity for optimal preservation. Stephanie Routhier Perry (2014) observed that digitisation and digital preservation are increasingly replacing traditional preservation methods in libraries, archives, and cultural heritage institutions. Galloway (2009) emphasised the importance of maintaining the authenticity and provenance of unique and unpublished archived content. Bultmann (2006) evaluated digitisation initiatives in the UK research library and archives sector, finding that 51 participating institutions were actively involved in digitisation, with improved access to collections being a primary benefit. In 2022 Mitra and Biswas also found that scanning is the most common method used for digitisation purpose in 22 archives in Kolkata.

3.   Objectives of the study

- To assess the status of digital preservation and digitisation practices within autonomous institutes and private university libraries

- To determine the availability of necessary ICT infrastructure for digitisation activities

- To identify the nature of collections undergoing digitisation and preservation efforts

- To investigate the motivations

driving digitisation and digital preservation initiatives, and analyse the obstacles encountered throughout the digitisation and preservation processes.

4. Hypothesis of the study

H1: There is no significant difference in the available infrastructure of Autonomous. Institutes and Private University Libraries.

H2: There is no significant difference in the challenges faced by autonomous institutes and private university libraries in the process of digitisation and preservation activities.

5. Methodology

A survey methodology was employed to undertake" Comparative Analysis of Digitisation and Digital Preservation Efforts in Libraries of Autonomous Institutions and Private Universities in Bengaluru" A structured questionnaire was devised and administered to librarians from Autonomous Institutes and Private Universities. 22 questionnaires were distributed randomly among librarians, and the response rate was 100%, with 22 librarians providing feedback. The sample size was determined using simple random sampling. Out of the total 16 private universities and 13 autonomous colleges in Bengaluru, 11 private universities and 11 autonomous colleges were selected for the study.

The collected data were analysed using MS Excel and SPSS, and the results were presented in tabular format, including frequencies, percentages, mean (M), and standard deviation (SD). Hypothesis testing was conducted using the Mann-Whitney U-test to examine the proposed hypotheses. The analysis revealed no significant difference between the two groups, as indicated by a p-value of 0.317, which exceeds the critical value of 0.05.

6. Data analysis and interpretation

Table 1: Demographic information

Sl. No	Variable	Values	Response	%
1	Gender	Male	16	72.73
		Female	06	27.27
2	Age	31-40	04	18.18
		41-50	13	59.09
		51-60	05	22.73
3	Institution	Autonomous	11	100
		Private university	11	100

Table 1 reveals that 72.73% of the respondents are male, while females make up 27.27%. Age distribution shows 18.18% are 31-40 years old, 59.09% are 41-50 years old, and 22.73% are 51-60 years old. The sample is predominantly male and primarily aged 41-50. All participants are evenly split between autonomous institutions and private universities, each fully representing their category. This demographic profile provides essential background for interpreting the survey responses and understanding the participant profile in the analysis.

Table 2: Libraries initiate digitisation and digital preservation

Sl. No.	Response	Autonomous Institutions	Private University	Total
1.	Yes	11(100%)	11(100%)	22(100%)
2.	No	00(0.00%)	00(0.00%)	00(0.00%)

Table 2 shows that all 22 libraries surveyed, from both autonomous (11) and private universities (11), have initiated digitisation and digital preservation efforts, indicating unanimous engagement in these initiatives. There were no respondents reporting non-participation, resulting in a 0% non-participation rate. This complete adoption underscores a widespread recognition of the importance of digitisation and digital preservation across diverse higher education institutions.

Table 3: Status of the digitisation and preservation

Sl. No.	Status	Autonomous Institution	Private University	Total
1.	Digitisation under process	00(0.00%)	00(0.00%)	00(0.00%)
2.	Digitised but preservation under process	00(0.00%)	03(57.9%)	03 (13.63%)
3.	Fully archived and provided Access	11(100%)	08(72.7%)	19 (86.36%)
	Total	11(100%)	11(100%)	22 (100%)

Table 3 elucidates the status of digitisation and preservation initiatives across autonomous and private universities. No respondents indicated their digitisation process is still ongoing, reflecting a 0% response rate for this phase. In autonomous institutions, none reported being in the stage where digitisation is complete but preservation is still in progress, resulting in a 0% response rate. Conversely, 57.9% (3 respondents) of private universities are in this phase. All respondents from autonomous institutions (100%, or 11 respondents) have fully archived and provided access to their materials, whereas 72.7% (8 respondents) of private universities have achieved this status. This indicates a higher maturity level in digital preservation among autonomous institutions compared to private universities.

Table 4: Familiar with using digital materials

Sl. No.	No. of years	Autonomous Institution	Private University	Total
1.	< 1 year	-	-	-
2.	2 years	1(9.09%)	3(27.2%)	4(21.05%)
3.	Above 2 years	10(90.90%)	8(72.8%)	18(78.94)
	Total	11	11(100%)	22(100%)

Table 4 delineates respondents' familiarity with digital materials, categorised by years of experience and type of institution: autonomous and private universities. No respondents from either category reported having less than 1 year of experience with digital materials. Among the respondents, 9.09% (1) from autonomous institutions and 27.2% (3) from private universities have 2 years of experience. A significant majority, 90.90% (10) from autonomous institutions and 72.8% (8) from private universities, have more than 2 years of experience. The table suggests that most respondents from both institution types are well-versed in using digital materials, with autonomous institutions having a slightly higher proportion of respondents with extensive familiarity.

Table 5: Digitised documents

Sl. No	Type of Materials	Born Digitised			Digitised Document			Document to be Digitised		
		A	P	Total	A	P	Total	A	P	Total
1	Rare Books	-	-	-	4(36.36%)	7(63.64%)	11(100%)	5 (45.45%)	4(36.36%)	9 (100%)
2	Project Reports	5(45.45%)	4(46.4%)	9(36.9%)	5(50.0%)	4(46.4%)	9(42.1%)	1 (12.5%)	3(57.9%)	4(21.05%)
3	Thesis/ Dissertations	4(36.3%)	5(45.4%)	9(81.8%)	2(25.0%)	3(57.9%)	5 (26.3%)	5(50.0%)	3(57.9%)	8(36.9%)
4	Faculty Publications	3(12.5%)	5(45.4%)	8(31.6%)	5(50.0%)	1(9.0%)	6 (26.3%)	3(37.5%)	5(45.4%)	8(42.1%)
5	Peer-reviewed Publications	2(12.5%)	-	2(5.2%)	5(37.5%)	3(57.9%)	9 (31.6%)	4(50.0%)	8(72.7%)	12(63.1%)
6	Back volumes	-	-	-	5(25.0%)	6(54.5%)	11 (42.1%)	9(62.5%)	2(18.1%)	11(36.9%)
7	Question papers of previous years	1(12.5%)	4(46.4%)	5(26.3%)	8(62.5%)	2(18.1%)	79(36.9%)	2(25.0%)	5(45.4%)	7(36.9%)

*A=Autonomous Institutions, P= Private University

Table 5 offers a detailed analysis of digitisation progress in autonomous and private institutions. Rare books are notably less digitised in autonomous institutions (36.36%) compared to private universities (63.6%), indicating a more advanced digitisation stage in the private sector. Autonomous institutions have a higher proportion of rare books yet to be digitised (63.64%) versus private universities (46.4%). Project reports are similarly digitised at 45.45% in autonomous institutions and 46.4% in private universities, but 57.9% of project reports await digitisation in private universities versus 12.5% in autonomous institutions, emphasising a higher urgency in private universities. Theses, faculty publications, and peer-reviewed articles also vary in digitisation progress, with autonomous institutions generally more advanced. Both institution types face challenges in digitising rare books and back volumes, emphasising ongoing efforts in digital preservation and improving access to scholarly resources.

Table 6: Software used in digitisation

Sl. No.	Software	Autonomous Institution	Private University	Total
1.	DSpace	09(81.81%)	8(72.7%)	17(77.27%)
2.	Eprints	02(18.19%)	03(27.27%)	05(22.73%)
3.	Greenstone	00(00.0%)	00(00.0%)	00(00.0%)
	Total	11(100.0%)	11(100.0%)	22(100.0%)

Table 6 provides an overview of digitisation software preferences in both autonomous institutions and private universities. DSpace emerges as the dominant choice in both sectors, with 81.81% of autonomous institutions and 72.7% of private universities utilising this software. Eprints is also notable, used by 25.0% of autonomous institutions and 57.9% of private universities, indicating its popularity as an alternative. Interestingly, Greenstone is not used by any surveyed institution in either sector. Overall, the table underscores the widespread adoption of DSpace for digitisation, while also highlighting Eprints as a significant alternative, particularly favoured among private universities.

Table 7: Hardware used for digitisation

Sl. No.	Devices	Autonomous Institution	Private university	Total
1.	Scanner	11(100%)	11(100%)	22 (100%)
2.	Server	8(36.36%)	08(36.36%)	16 (72.72%)
3.	Computer	11(100%)	11(100%)	22 (100%)

Table 7 outlines the hardware used for digitisation in autonomous institutions and private universities. Scanners are universally employed in autonomous institutions, utilised by 100% of respondents for digitisation. Similarly, computers are widely used, with all respondents employing them for digitisation purposes. Servers are also utilised, albeit to a lesser extent, by 36.36% of autonomous institutions. Private universities exhibit a higher prevalence of hardware used for digitisation: all surveyed institutions utilise scanners and computers, showcasing their universal adoption. Servers are also prominently utilised, with 72.7% of private universities employing them. However, printers are notably absent from digitisation efforts in private universities, with none of the institutions reporting their use. The table underscores the critical role of scanners and computers in the digitisation processes of both autonomous institutions and private universities, highlighting their essential function in converting physical materials into digital formats effectively.

Table 8: Manpower allocation for digitisation

Sl. No.	Manpower	Autonomous Institution	Private University	Total
1.	Librarian	9(81.9%)	9(81.9%)	18(81.81%)
2.	Deputy Librarian	2(25.0%)	5(45.4%)	07(31.81%)
3.	Assistant Librarian	1(12.5%)	4(46.4%)	05(22.72%)
4.	Library Assistant	00(00.0%)	00(00.0%)	00

Table 8 highlights the manpower allocation for digitisation tasks in autonomous institutions and private universities, emphasising the central role of librarians. In both institution types, 81.9% of respondents report employing librarians for digitisation. In autonomous institutions, deputy librarians (25%) and assistant librarians (12.5%) are also involved, but library assistants are not engaged. Private universities show a similar pattern, with deputy librarians (45.4%) and assistant librarians (46.4%) playing more significant roles than autonomous institutions, but library assistants remain uninvolved. Overall, the table underscores the predominant role of librarians in digitisation efforts across both sectors.

Table 9: Storage media for digitised materials

Sl. No.	Storage Media	Autonomous Institution	Private University	Total
1.	Hard Disk	03(27.27%)	01(9.0%)	04(18.18%)
2.	Cloud Computing	03(27.27%)	03(27.27%)	06(27.27%)
3.	Server	04(36.36%)	03(27.27%)	07(31.81%)
4.	3rd Party Storage	01(9.09%)	04(36.3%)	05 (22.72%)
	Total	11(100.0%)	11(100.0%)	22(100.0%)

Table 9 details the storage media used for digitised materials in autonomous institutions and private universities. In autonomous institutions, hard disks and cloud computing are equally popular, each used by 27.27% of respondents, while servers are used by 36.36% and third-party storage by 9.09%. In contrast, private universities show a different pattern: only 9.0% use hard disks, but cloud computing and servers are each used by 27.27%, with third-party storage being more prominent at 36.3%. This indicates a diverse approach to storage, with private universities favouring cloud and third-party solutions more than autonomous institutions, suggesting a trend towards outsourcing storage needs in the private sector.

Table 10: Reasons for the digitisation

Sl. No.	Reasons for the Digitisation	Autonomous Institution	Private University
1.	Enhance the Access	11(100.0%)	9(81.8%)
2.	Remote Access	10(90.90%)	9(81.8%)
3.	Modernisation of Library Services	9(81.81%)	11(100.0%)
4.	Quick Accessibility of Records	9(81.81%)	11(100.0%)
5.	Library Policy by central bodies to maintain both Print & Electronic collection.	3(37.5%)	10(90.9%)
6.	Decline in the use of print materials	2(18.18%)	11(100.0%)
7.	Users Demand	5(45.45%)	9(81.8)
8.	24/7 access to its clients	7(63.63%)	11(100.0%)

Table 10 analyses the primary motivations for digitisation in autonomous institutions and private universities. In autonomous institutions, enhancing access to resources is cited by all respondents (100%), with 90.90% emphasising remote access and 81.81% highlighting modernisation of services and quick access to records. Similarly, in private universities, all respondents (100%) prioritise modernising services and quick access to records, with 81.8% also focusing on enhancing access and remote access. Both institution types recognise external influences like policies mandating the maintenance of print and electronic collections and the declining use of print materials. Private universities place particular emphasis on 24/7 access to resources, noted by all respondents (100%) as a significant driver for digitisation.

Table 11: Challenges in digitalisation and digital preservation

Sl. No.	Challenges	Strongly Agree		Agree		Neutral		M	SD
		A	P	A	P	A	P		
1.	Data loss	3(37.5%)	5(45.4%)	4(50.0%)	4(36.3)	1(12.5%)	2(18.1%)	1.737	.7335
2.	fragility of storage media	2(25.0%)	03(57.9%)	5(62.5%)	6(54.5%)	1(12.5%)	2(18.1%)	1.895	.6578
3.	The rapid evolution of technology	2(25.0%)	03(57.9%)	5(62.5%)	6(54.5%)	1(12.5%)	2(18.1%)	1.895	.6578
4.	Selection of materials to be digitised	4(50.0%)	2(18.1%)	4(50.0%)	8(72.7%)	00	1(9.0%)	1.737	.5620
5.	Security and privacy concerns	3(37.5%)	6(54.5%)	4(50.0%)	5(45.4%)	1(12.5%)	00	1.632	.7609
6.	Lack of standards	2(25.0%)	6(54.5%)	4(50.0%)	5(45.4%)	2(25.0%)	00	1.684	.6710
7.	IPR issues	2(25.0%)	6(54.5%)	5(62.5%)	5(45.4%)	1(12.5%)	00	1.632	.5973
8.	Lack training Staff	2(25.0%)	7(63.6%)	5(62.5%)	03(57.9%)	1(12.5%)	1(9.0%)	1.632	.6840
9.	Lack of funding	4(50.0%)	6(54.5%)	4(50.0%)	5(45.4%)	-	-	1.474	.5130

Table 11 outlines the challenges in digitisation and digital preservation in libraries, revealing significant concerns such as data loss, which is strongly agreed upon by 37.5% of respondents from Autonomous Institutions and 45.4% from Private Universities. Additionally, the fragility of storage media and rapid technological changes are notable challenges, especially for Private Universities. The selection of materials for digitisation is another key issue, with Private Universities highlighting its importance more than Autonomous Institutions. Security and privacy concerns are prevalent across both groups, with a substantial percentage strongly agreeing on their significance. The lack of standards and intellectual property rights (IPR) issues suggests the need for standardised protocols and legal frameworks. The shortage of trained staff is particularly concerning for Private Universities, emphasising the need for capacity-building initiatives. Lastly, the lack of funding is a major challenge for Autonomous Institutions, underscoring the essential role of financial support in effective digitisation and preservation efforts.

7. Discussion

The findings of the study reveal a comprehensive adoption of digitisation and digital preservation policies across all libraries, indicating a sector-wide commitment to enhancing library services and ensuring the longevity of collections. The high level of experience with digital materials among respondents (78.94% with over two years) suggests a well-established familiarity that likely streamlines the integration of digital resources into daily library operations. Prioritisation of digitising rare books and critical documents underscores their cultural and scholarly value, although the lower percentages for theses/dissertations and faculty publications suggest varying priorities or ongoing efforts. DSpace emerges as the predominant software choice (77.27%), reflecting widespread trust in its capabilities for managing digital collections effectively. The prevalent use of scanners, computers, and servers underscores robust technological infrastructures supporting digitisation endeavors. Librarians are identified as pivotal in these initiatives (81.81% responsibility), highlighting their essential role in project management and execution. Motivations for digitisation such as enhanced access, modernisation of services, and remote accessibility align with strategic goals aimed at improving user experience and expanding service reach. The adoption of diverse storage solutions like cloud computing and third-party options demonstrates flexibility in managing digital assets, albeit with concerns about data loss (42.1%) and challenges in material selection for digitisation (31.7%)

indicating ongoing operational complexities and strategic decision-making needs within library digitisation efforts.

8.   Recommendations and conclusion

The study on digitisation and digital preservation in Bengaluru's libraries highlights several key recommendations for enhancing these efforts. Since all respondents recognise the importance of digitisation policies, libraries should develop comprehensive strategies with clear objectives and responsibilities. While many collections have been digitised, prioritising preservation is crucial to ensure long-term access and integrity, necessitating resource allocation for systematic preservation strategies.

The widespread familiarity with digital materials, and continuous training for librarians and staff is essential to maintain and improve digital literacy and management skills. Diversifying digitisation efforts to include audio-visual recordings, manuscripts, and archival documents will enrich digital collections beyond the commonly digitised rare books, documents, and theses/ dissertations. With the predominant use of Dspace software, libraries should continue using advanced technologies to streamline processes and enhance the quality of digital collections. To address concerns about data loss and storage, robust backup and storage solutions, including cloud computing and third-party services, are necessary to protect against data corruption or loss. Proactively tackling challenges like data loss and material selection through mitigation strategies and stakeholder support will be vital for the success of digitisation and preservation initiatives.

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