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Editorial

We are pleased to present Volume 14, Issue 01 of Trends in Information Management (TRIM), featuring a diverse and intellectually engaging collection of scholarly contributions that reflect the evolving dimensions of Library and Information Science in an increasingly digital and interconnected world. As a peer-reviewed, open-access journal published by the Department of Library and Information Science at the University of Kashmir, TRIM continues to foster critical academic dialogue on information systems, digital transformation, knowledge access, scholarly communication, and emerging technological innovations shaping contemporary information environments.

The articles featured in this issue collectively demonstrate the growing interdisciplinary scope of Library and Information Science and its relevance to broader societal, educational, technological, and cultural transformations. Notably, this issue incorporates selected papers presented at the ICSSR-sponsored *National Seminar on Libraries: Pillars of Unity, Harmony and National Integrity*, organised by the Department of Library and Information Science, University of Kashmir, J&K, India, from 24 - 25 March 2025. The contributions examine diverse topics including digital inclusion, remote access technologies, bibliometric mapping, digital marketing, information behaviour, sustainability, civic engagement, scholarly communication, and health information awareness. Together, these studies highlight how libraries and information institutions continue to adapt to rapidly changing user expectations and technological ecosystems.

The issue begins with an article, “*Causes of Human Errors in Information Security*” by M. Ahmed, L. Sharif, and F. Ahmed, in which the authors apply Grounded Theory to examine the role of human errors in the field of information security. It also features, “*Bridging the Digital Divide with Library Services in India: Challenges and Strategic Responses*” by Margam Madhusudhan, which examines the role of libraries in promoting digital inclusion through digital literacy initiatives, infrastructure development, and community-oriented services. In “*Role of Remote Access Services in Crisis Management: Perceptions and Expectations of A.C. Joshi Library Users*”, Shahzeb and Preeti Mahajan examine the growing importance of remote access services in supporting uninterrupted access to scholarly resources in post-pandemic academic environments.

The next contribution, “*Decoding Audience Sentiments on the ‘Mann ki Baat’ Radio Broadcast Using Data Mining Approaches*” by Maya Deori, Irene Lalruatkimi, and Manoj Kumar Verma, applies sentiment analysis and data mining techniques to examine audience engagement and public discourse in digital communication spaces. The issue further includes “*The Myths and Magic Behind Psychological Skills Training: A Narrative Review*” by Puja

Khatrī, Atul Shiva, Vidushi Dabas, and Harshleen Kaur Duggal, which explores the role of psychological skills training in performance enhancement and behavioural development.

In *“Treading the Green Path at Panjab University Library (India)”*, Pragya Lohia, Preeti Mahajan, and Rishabh Shrivastava examine sustainability-oriented initiatives and environmentally responsible practices within library environments. The contribution titled *“Libraries in the Digital Age: Anytime, Anywhere, Any Resource”* by Afsana Rashid examines the transformation of libraries into digitally accessible knowledge spaces shaped by evolving technologies and changing user needs.

Another important study, *“Mapping Scholarly Communication on the Role of Libraries in Crisis Management and Disaster Response: A Bibliometrics Analysis”* by Sakshi Jain, Sumit Kumar, and Sharad Kumar Sonkar, provides a scientometric overview of global research trends on libraries’ roles in crisis management and disaster response. In *“Evolving Scholarship in South Asia: Bibliometric Insights from the University of Kashmir”*, Aamirul Haq, Shahid Maqbool Mir, Sabreena Saleem, Yasir Rashid Lone, Tajamul Ahmad Bhat, and Mahmood ul Ajaz Wani analyse research productivity and scholarly communication patterns associated with the University of Kashmir.

The paper *“National-Level Assessment of LIS Doctoral Theses in Shodhganga: A Metadata Driven Study”* by Vinay Manral, Riya Raj, and Vinit Kumar examines doctoral research trends and thematic developments in Library and Information Science through metadata analysis of theses archived in Shodhganga. In *“Bridging the Digital Divide as a Brand Strategy: Strengthening Library Brand Equity”*, Furqana Altaf, Ishret Fayaz, and Farzana Gulzar examine how digital inclusion initiatives can strengthen library brand equity and institutional visibility.

The issue also includes *“Libraries as Civic-Epistemic Institutions Shaping Digital and Global Citizenship”* by Mahender Pratap Singh, Shivangi Shukla, and Komal Gupta, which highlights the role of libraries in promoting democratic participation, information ethics, and global citizenship in the digital era. In *“The Digital Frontier: Exploring the Impact of Digital Marketing on Libraries using Bibliometric Values”*, Shahid Maqbool Mir, Aamirul Haq, Tajamul Ahmad Bhat, Yasir Rashid Lone, and Mahmood ul Ajaz Wani examine the relationship between digital marketing practices and library visibility through bibliometric analysis.

The contribution *“Mapping the Scientific Literature of e-Services in Libraries: A Bibliometric Study”* by Ishfaq Hussain Wani, Shahid Rashid, and Asif Mohammad Ganaie explores global research trends in electronic library services and the evolving digital service ecosystems.

Another paper, *“Screen Time Exposure and Its Association with Physical Health and Eating Behaviors among Children Aged 6–12 Years”* by Nayera Masoodi, Maria Maqbool, and Muneeba Malik, explores the relationship

between digital exposure, health outcomes, and behavioural patterns among children.

The paper, “*Perception of Tour Guides Towards Heritage Tourism: A Qualitative Study of Rajasthan (India)*” by Zaneera Shabnum, Zeenat Nazir, and Priya Singh, examines Rajasthan tour guides’ views on heritage tourism, highlighting their contributions to cultural preservation and visitor engagement, as well as the challenges affecting their profession.

The issue concludes with a paper, “*Towards Designing a Digital Repository for the Cultural Heritage of Kashmir: Experiences and Challenges*” by Nadim Akhtar Khan. This paper explores the development of a digital repository for preserving and providing accessible, long-term access to Kashmir’s rich cultural heritage, while highlighting the practical challenges of digitization, metadata management, and stakeholder collaboration.

Collectively, the papers featured in this issue reaffirm TRIM’s commitment to publishing research that bridges theoretical perspectives with practical concerns across evolving information environments. The contributions reflect the growing intersections of Library and Information Science with technology, communication, sustainability, education, public policy, health, and digital culture.

We express our sincere gratitude to all authors, reviewers, editorial board members, and contributors for their scholarly dedication and collaborative efforts that made this issue possible. Their continued support strengthens TRIM’s academic quality and vision. We hope that the studies presented in this issue will stimulate meaningful academic dialogue, inspire future research, and advance innovative practices within the global information community.

Warm Regards,

Prof. Sumeer Gul
Editor-in-Chief



Causes of Human Errors in Information Security: A Grounded Theory Study

M. Ahmed
L. Sharif
F. Ahmed

Abstract

In this paper, the role of human errors in the field of information security is discussed. The latter has attracted much attention from information security researchers in the recent past. According to current statistics, human errors are a major component of problems in information security, with 68% of breaches involving a non-malicious human element (Verizon Business, 2024) and the global average cost of a data breach reaching \$4.88 million (IBM, 2024). In spite of such alarming statistics, there has been comparatively little empirical research on the role of human errors in information security. This is particularly evident at organizational level, due in large part to the unwillingness of organizations to share information and statistics on security issues. In this paper, grounded theory has been employed as a research methodology to investigate the main causes of human errors in information security.

Information security experts (103 in total) from around the globe were asked a series of open-ended questions and their responses were used to develop a detailed list of human errors. This paper represents an important contribution to our understanding of the causes of human error in information security.

Keywords: Grounded Theory, Human Errors, Human Computer Interaction, Information Security, Structural Equation Modelling, Security Engineering

Introduction

Security breaches have escalated sharply in recent years, inflicting substantial financial and reputational losses on the organizations affected. This trend has brought information security to the forefront of attention across industry, government, and academia.

The discipline rests on three core principles — confidentiality, integrity, and availability (SANS Institute, 2024; Stallings & Brown, 2023) — upheld through the complementary techniques of prevention, detection, and response (Dhillon & Backhouse, 2001; Von Solms & Van Niekerk, 2013). Underpinning all three is the capacity to distinguish authorized from unauthorized users, a process known as user authentication, regardless of whether a user connects from the workplace, from home, or from any other location.

The information security research community has increasingly acknowledged the part that human behaviour plays in security failures. In spite of many advances in security technology, humans remain widely regarded as the weakest link in the security chain, and the contribution of human factors to security breaches is still inadequately addressed by prevailing models. Researchers and practitioners have repeatedly urged that human factors be woven into the design and evaluation of IT security systems

(Khadka & Ullah, 2025). Human–Computer Interaction (HCI), a discipline that places the human dimension at the centre of system design, offers a relevant perspective: it pursues an optimal trade-off between the quality of system output and the cost — to users, stakeholders, and the system itself — of achieving it. Yan et al. (2017) and McNeese and Forster (2017) have argued that HCI research should develop validated theory and models so that practical knowledge can be transferred more reliably to new designs.

Information security has traditionally been seen as a technical challenge — a matter of hardware and software. Yet research has shown that an overwhelming share of breaches stems from human factors such as inadequate training and limited security awareness (Ahmed, 2013). Many organizations still direct their efforts almost entirely toward technological controls, overlooking the human dimension. Technical safeguards are indispensable, but on their own they cannot compensate for the errors and oversights of the people who use IT systems. Discussion of new threats within the security community, although valuable, does not automatically translate into better-informed end users (ISO/IEC 27001:2022).

Human errors in the field of information technology and security cause great losses around the world. In May 2017, British Airways suffered a major IT outage widely attributed to human error when a contractor accidentally powered down and then restarted the uninterruptible power supply at a data center. This prevented the booking and boarding of flights throughout the day as well as missing luggage for passengers and financial losses estimated at over £80 million for the airline. Additionally, the misuse of passwords in business systems and highly important sites makes these sites easy targets for intruders on the Internet. Research has consistently highlighted the need for clear policies to change passwords periodically and for passwords to be complex and strong enough to protect systems from hacking or session hijacking (NCSC, 2024).

More recently, a discussion on human errors was sparked by the revelation that drug errors in England have been causing appalling levels of harm and death. Research carried out by researchers from Manchester, Sheffield and York universities suggested that 237 million drug-related errors were being made in GPs, hospitals, pharmacies and care homes which amounted to 700 deaths a year. Janet Davies, the chief executive of the Royal College of Nursing concluded that human error was one of the biggest risks in medicine, whereas Secretary Jeremy Hunt pointed out that human error was a global phenomenon and not unique to one country. It is evident that human error is a predominant cause of crime/cybercrime, affecting companies and institutions from all areas alike (Elliott et al., 2018).

Related Work

Within parts of the information security industry there has long been a

tendency to treat technology as a complete answer to security problems. Yet technical controls cannot, on their own, manage the full range of security risks; the people within an organization remain its first line of defence (Abdulla et al., 2014; NCSC, 2024). Tools such as firewalls, antivirus software, and virtual private networks (VPNs) are undeniably important elements of an organization's defensive arsenal, but relying on a purely technological strategy carries serious limitations.

Ultimately, information security is a human matter. Studies of how attackers compromise IT systems repeatedly show that the human element is decisive in most successful intrusions. A careless employee's simple misconfiguration can leave network ports exposed, weaken firewalls, and render entire systems defenceless. In practice, human error is a more probable cause of serious breaches than technical weaknesses alone (Hadlington, 2021; Verizon Business, 2024).

Empirical investigation of human error in information security nonetheless remains limited, particularly at the organizational level (Pollock, 2017; Sulaiman et al., 2022), although recent interdisciplinary research has begun to close this gap (Khadka & Ullah, 2025). The scarcity of evidence is widely attributed to organizations' reluctance to disclose data on their security incidents and vulnerabilities. This reticence is consequential, since the continued growth of the internet and e-commerce depends on understanding and reducing such errors.

The prominence of human error is not unique to computing. Across high-risk industries — from aviation to nuclear power generation — human error is estimated to account for the majority of recorded events, with figures commonly cited at around 80 percent and higher (U.S. Department of Energy, 2009). Human and technological factors cannot be cleanly separated, because accomplishing almost any task today depends on both.

Few occupations now operate without technology, yet machines lack human intuition and judgment and must be instructed through explicit commands. While an operator can interpret machine feedback such as alarms and readings and translate it into new instructions, full automation has not displaced this human role: Airbus's attempt to introduce fully automated airliners, for instance, was rejected by the travelling public. Interaction between people and machines is therefore enduring (Shneiderman et al., 2022).

Because every failure can ultimately be traced to a human decision somewhere in the chain, people tend to seek someone to hold responsible when things go wrong.

Human cognition is intricate and shaped by numerous influences, which may be grouped as internal — those arising from the organizational environment — and external, relating to an individual's personal life. As humans are inherently fallible, error can never be wholly eliminated (Pascoe et al., 2024).

The contributing factors are many and include inadequate supervision, carelessness, lapses in concentration, and insufficient training; depending on the setting, the resulting errors may be severe enough that they cannot be discounted in any serious risk assessment.

Consistent with this, human factors research continues to characterize people as the weakest link in the security chain (Khadka & Ullah, 2025). Contemporary industry reporting bears this out: the 2024 Data Breach Investigations Report found that a non-malicious human element — error or social engineering — was a component of 68 percent of breaches, with errors alone implicated in 28 percent (Verizon Business, 2024). Table 1 sets out these and other leading factors. Analyses of breach costs similarly underline the financial weight of the human factor (IBM, 2024), and comparable work has likewise reported that a substantial share of incidents stem from human error rather than deliberate crime (Ahmed et al., 2012; Harper et al., 2015).

Table 1: Selected contributing factors in data breaches; categories overlap and do not sum to 100%. Adapted from Verizon Business (2024)

Contributing factor	Breaches (%)
Human element (non-malicious: error or social engineering)	68
Errors	28
Ransomware and other extortion	32
Third-party involvement	15

Although a considerable body of statistics documents the prevalence of human error in organizational settings, far less attention has been paid to techniques for reducing or mitigating it.

Reason’s Generic Error Modelling System

Preventing human error in information security depends first on recognizing the different forms such error takes, alerting users to the associated risks, and putting measures in place to forestall them. The human factors field has produced a range of models for understanding and classifying types and levels of human error, and these have been applied successfully across industries to investigate the causes of accidents (Reason, 1990). Among them, the Generic Error Modelling System (GEMS) examines both the cognitive mechanisms underlying error and the organizational and managerial conditions that make error more likely (Reason, 1990; Reason, 1997). GEMS offers a useful lens for interpreting human error in information security.

Under GEMS, mental activity operates in one of two modes (Reason, 1990):

- *Attentional Mode*: draws on conscious awareness and working memory. It is effortful, slow, and hard to sustain over long periods, and it supports tasks such as setting goals, tracking progress, and recovering from

mistakes. In a security context, a user might rely on it when trying to recall login credentials such as a username or password.

- *Schematic Control Mode*: handles familiar information rapidly and with little conscious effort, and is not constrained by the volume or duration of the information held.

Different types and levels of error can arise at the various stages of cognitive processing.

Categories of Behaviour for Distinguishing Error Types

Reason (1990) classifies human error according to an individual's level of performance.

These errors can be distinguished by both psychological and situational factors, and arise as follows:

- *Skill-based Errors*: are routine, automatic, and unconscious, occurring in schematic control mode; they take the form of slips and lapses — unintended actions.
- *Rule-based Errors*: arise when stored rules are selected and applied to a situation. This behaviour is largely automatic and comes into play when the routine, skill-based response must be adjusted, with the user applying a remembered rule and monitoring its outcome.
- *Knowledge-based Errors*: occur under attentional control and operate from first principles, arising only after a familiar approach has repeatedly failed and no ready-made solution exists.

Most errors tend to be skill-based rather than rule- or knowledge-based.

A further distinction, drawn by the National Research Council's Computer Science and Telecommunications Board, separates accidental from deliberate human error (National Research Council, 2002). Accidental causes are unintentional — a coding mistake that crashes a system, for example — whereas deliberate causes are attacks in which harm is intended. In this paper, human error is taken to cover both.

The errors users commit can open the door to security breaches in several ways, whether through limited technical knowledge, technical mistakes, or plain carelessness. Stanton et al. (2005) set out five categories of end-user security behaviour, spanning users who are both aware and conscientious through to those who deliberately bypass controls; this taxonomy informs how human errors are classified in the present study.

As internet access has become near-universal, many users possess only rudimentary computing skills — enough to browse the web or send email — and remain unaware of the importance of safeguards such as antivirus software, firewalls, and timely updates and patches (Hadlington, 2017). Such users are readily targeted by malware and attackers, and a single compromised machine can become a staging point for attacks on other systems.

Even highly skilled software developers can make consequential mistakes.

Though usually unintentional, these can introduce security loopholes that attackers exploit to seize control of affected systems. Such flaws can be remedied through patches, but administrators and end users do not always apply even critical updates, often through negligence.

Carelessness is among the most common and damaging sources of human error in this domain. It surfaces in many ways — passwords left on visible notes, harmful websites visited despite browser warnings, and security policies disregarded or unenforced. The deliberate omission of security measures has been shown to be strongly predicted by users' attitudes and their perception of threat (Workman et al., 2008).

Weak, easily guessed passwords are another manifestation. An analysis by the UK's National Cyber Security Centre identified "123456" as the most common password found on breached accounts, alongside other predictable choices such as the names of football clubs (NCSC, 2019). Adams and Sasse (1999) argued that users often adopt weak passwords not from ignorance but because security mechanisms fail to fit their needs — an observation that remains pertinent — and the NCSC has described choosing a strong password as the single most important step a user can take for their own online security (NCSC, 2019).

A widely cited demonstration of careless behaviour was an experiment by the U.S. Department of Homeland Security examining how easily attackers might exploit employees to reach internal systems (Edwards et al., 2011). Discs and USB drives were deliberately left in the car parks of government and contractor sites; of those who picked them up, around 60 percent connected the devices to office computers, rising to roughly 90 percent when the device carried an official-looking logo.

Careless or untrained insiders pose an even greater risk. This group includes employees susceptible to social engineering as well as malicious or disaffected staff. The financial toll of breaches is heavy, and most trace back to human error; despite investment in physical and software defences, most organizations remain exposed to even basic risks (Pascocoe et al., 2024). A measured combination of policy, procedure, training, and technology offers the best prospect of reducing that exposure.

Research Methodology

Grounded theory (GT) can be defined as a systematic methodology that involves the generation of theory from data (Corbin & Strauss, 2015; Martin & Turner, 1986). Although GT is mainly used in qualitative research, it can quite easily be employed for quantitative data (Corbin & Strauss, 2015; Glaser & Strauss, 1967). GT fundamentally contradicts the conventional model of research. GT works in almost the reverse of conventional research. The process starts with data collection through a selection of methods. Using the collected data, key points are selected using a series of codes derived from

the text. The codes are then grouped into related concepts in order to make them more workable. The concepts form the basis for categories. The latter then form the basis for the creation of theory. The entire process from codes to theory is summarized in Table 2 (Martin & Turner, 1986).

Table 2: Four Stages of Analysis; Adapted from Martin and Turner (1986)

Stage	Purpose
Codes	Identifying anchors that allow the key points of the data to be gathered
Concepts	Collections of codes of similar content that allows the data to be grouped
Categories	Broad groups of similar concepts that are used to generate a theory
Theory	A collection of explanations that explain the subject of the research

Table 3 presents a comparison of some important research methodologies and highlights some of the key features that distinguish GT as a strong candidate for this research:

**Table 3: Comparison of Research Methodologies
[Adapted from (Creswell & Poth, 2018)]**

Dimension	Phenomenology	Grounded Theory	Experiments
Focus	Understanding the essence of experience about a phenomenon	Developing a theory grounded in data from the field	Experiment consists of a planned action
Origin	Philosophy, sociology, psychology	Sociology (we will apply it to engineering field)	Can apply to any field
Data collection	Long interviews with up to 10 people	Interviews with 20–30 individuals to ‘saturate’ categories and detail a theory	Applied on live computer system
Data analysis	▪ Statements ▪ Meanings ▪ Meaning themes ▪ General description of the experience	▪ Open coding ▪ Axial coding ▪ Selective coding ▪ Conditional matrix	Results are recorded and analyzed or reflected on
Narrative form	Description of the ‘essence’ of the experience	Theory or theoretical model	Mathematical modelling

Data Collection

The use of open-ended questions in this research allowed the participants to answer questions in an unconstrained manner. Open-ended questions also

allow for finer details to be incorporated to the satisfaction of the participants (Creswell & Poth, 2018) and thus are deemed more suitable for this research as compared to other data gathering techniques such as interviews, questionnaires and experiments (Lazar et al., 2017).

A survey was conducted using open-ended questions in order to find a minimum of five of the most important causes of information security human errors (HE) facing organizations around the world today. Participants were able to answer the open-ended questions using a Word-processed form designed with ample space for both a short title and a detailed rationale for each issue. The forms were pre-tested by two academics from among the sample of information security experts. All were requested to return useable responses.

Table 4 presents a summary of the data collection process. A wide range of geographical regions were represented, as shown in Tables 5 and 6. The respondent pool was 29 countries with academic and industry participation reflective of the types of organizations that hire information security academics and professionals. Tables 5 and 6 list the demographic features of the samples and also show the total numbers: AISE participant numbered 72 and IISEs 31, from 27 and 7 different countries respectively.

Table 4: 103 Participant sent responses

Email sent to participants	No. of participants	Response received from no. of participants	Sampling type
Academics	297	25	Cluster
Academics and Industrial	728	58	Random
First reminder to academics	211	3	Cluster
Second reminder to academics	211	5	Cluster
First reminder to Industrial	123	12	Random
Total	1025	103	

PhD	= 40
PhD Scholars with MCSE and CCSE	= 28
MSc with MCSE and CCNP	= 4
PhD with CCSE	= 4
PhD Scholars with CCSE	= 14
MSc with MCSE and CCNP	= 4
BSc with MCP and CCNA	= 9

**Table 5. Academic Information Security Experts (AISEs)
– Participants from 27 Countries**

Country	Frequency	Country	Frequency	Country	Frequency
Afghanistan	2	China	3	Palestine	2
Algeria	2	Croatia	2	Saudi Arabia	4
Australia	1	Egypt	4	South Korea	1
Bahrain	2	France	2	Switzerland	1
Bangladesh	1	Italy	2	Syria	1
Bolivia	2	Jamaica	1	Tanzania	1
Bosnia	2	India	4	Thailand	1
Bulgaria	1	Pakistan	5	UK	17
Canada	2	Motswana	1	USA	5

**Table 6: Industrial Information Security Experts (IISEs)
– Participants from 7 Countries**

Country	Frequency	Country	Frequency
Algeria	3	USA	4
Australia	2	India	4
Egypt	4	UK	11
Ghana	3	Total	31

Data Analysis and Results

This section discusses the data analysis approach that is based on the open coding technique used within GT. Open coding is a technique that employs a form of content analysis in order to classify data into concepts that originate from the data rather than from any pre-defined hypotheses based on outside sources such as literature. The respondents' short titles (i.e. HE causes) as well as a frequency analysis of keywords and phrases in the respondents' rationales form the primary bases for category identification at this stage of coding (Corbin & Strauss, 2015).

The open-ended questions generated 2,060 comments and statements. The total responses contained in excess of 111,240 words, thereby offering rich content that is suitable for qualitative analysis and subsequent development of a theoretical model for this research (to be presented in a future paper).

The above discussion can be summarized in the form of mathematical calculations as follows. The total number of comments/statements in the open-ended questions (Ct) was determined. The participants were asked to provide five HE causes/issues in the first open-ended question. Although the minimum requirement was five HE issues/causes, most participants provided more than two pages of text by listing five or more issues/causes with an explanation of each. Therefore, on average, each participant provided 10 comments or statements.

Total number of participants, Pt	= 103
Average number of comments or statements per participant, Cv	= 10
Total number of comments or statements, Ctq1 = Pt * Cv = 103 * 10	= 1,030
Average number of text pages per participant, Tp	= 2.25
Average number of words per page with single line space, Wp	= 480
Total number of words, Wt = Pt * Tp * Wp = 103 x 2.25 x 480	= 111,240

Using this open coding procedure, 95 categories of causes/issues were identified from the data. The first 20 (of the 95) causes are listed in Table 7.

**Table 7: Causes of information security human errors,
Top 20 categories after open coding listed in frequency order**

S.No.	Causes	Frequency
1	Carelessness and ignorance of employees and users	65
2	Unawareness of common computer knowledge and needs	64
3	Weak password management	54
4	Protection and security issues	43
5	Lack of following policies and structures	34
6	Inexperience and untrained employees	31
7	Cultural issues	25
8	Lazy and uninterested employees and users	23
9	Lack of training and education	22
10	Weak management and leadership	22
11	Technical error by programmers	21
12	Human memory	20
13	Lack of higher management commitment	19
14	Fatigue and stress	17
15	Lack of involvement and motivation	17
16	Viruses and anti-virus ignorance	16
17	Human computer interaction	14
18	Updates and patches	14
19	Behaviour and ethics	14
20	Criminal intent	13

Discussion

As is evident from Table 4, different sampling methods were employed for data collection. Cluster sampling was used for participants known to the authors either directly or indirectly, random sampling for participants unknown to the authors and snowball sampling used for communication among participants. The use of cluster sampling yielded 33 participant responses whilst 70 participant responses resulted from the use of snowball and random sampling. GT stipulates that one full cycle of open, axial and selective coding should be carried out with a set of data before moving to the next phase of this or any other study. The minimum of one hundred participants must also be ISEs, as planned in this research. The originators

go so far as to suggest that researchers should not collect the next set of data until they analyze the previous set. The reason for this is so as to use the learning from coding the set in the next stage. However, it was not possible to collect data from a sufficient number of ISEs. Consequently, the study shifted back and forth between Straussian and Glaserian approaches in order to collect data from a sufficient number of participants. The use of both GT approaches (Straussian and Glaserian) along with the three types of sampling (cluster, random and snowball) was deemed to be the only feasible option. Data were collected from 103 participants by contacting AISEs and IISEs around the world. In total, 1,025 potential participants were contacted, resulting in a 10.04% response rate. Without blending the two GT approaches, it would not have been possible to collect the required data for this research (Pollock, 2017).

As reported by the research participants (see Table 7), user carelessness was ranked as the leading cause of human errors in information security. A lack of computer security knowledge is shown to be the second major cause of human errors in Information Security. Poor password management and a lack/absence of security policy implementation are also deemed to be critical causes of human errors.

Some of the other causes of human errors in information security identified in this research include inexperienced and untrained users, cultural issues, lazy and uninterested employees and users, lack of continuous user training and education, lack of strategic leadership, technical errors by programmers, lack of management commitment, ignorance of computer viruses and outright criminal intent.

The research also suggests that due to global demand, it is a great challenge to recruit and retain adequately trained and educated information security staff.

Conclusions

This paper is an extension of our past work (Ahmed et al., 2012) and an attempt to narrow the gap between the theoretical and practical aspects of information security. In Ahmed et al. (2012), the role of human errors was discussed based on relevant literature in the field. For the purpose of this paper, information security experts from around the world were invited to share their knowledge and expertise in the field. This paper is one of the first information security research studies of its kind to utilize a blended approach based on both Straussian and Glaserian GT techniques. As such, this paper represents a significant contribution to the field.

Future Work

Future work in this field will extend this research by:

- 1) posing another open-ended question to seek the remedies for human

- errors in information security, and
- 2) using the responses to develop a theoretical model using GT and to derive a survey tool for further data gathering from ISEs to test the theoretical model. The model will be tested for validity using Structural Equation Modelling (SEM).

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Bridging the Digital Divide with Library Services in India: Challenges and Strategic Responses

Margam Madhusudhan

Abstract

This paper examines the role of library services in addressing digital exclusion through infrastructure provision, digital literacy initiatives, and community engagement. Using a descriptive and interpretative approach based on secondary sources, including policy documents, international reports, and scholarly literature, the study analyzes key dimensions of the digital divide, inequitable access to digital infrastructure, deficits in digital skills, and limited availability of relevant content.

The findings demonstrate that libraries in India are evolving from traditional repositories into technology-enabled community hubs that provide free internet access, e-resources, digital skills training, and support for e-governance services. Initiatives such as the integration of Common Service Centres (CSCs), the National Digital Library of India (NDLI), and alignment with Digital India and the National Education Policy 2020 illustrate strategic institutional responses. Despite persistent challenges related to funding, infrastructure, and professional capacity, strengthened investment, policy integration, and inclusive service design can enhance libraries' contribution to digital equity and inclusive national development.

Keywords: *Digital divide, library services, digital inclusion, digital literacy, public libraries, India.*

Introduction

Libraries play a pivotal role in bridging India's digital divide by providing free internet access, digital literacy training, and e-resources, particularly in rural areas where over 75,000 public libraries exist. Despite this, challenges like poor infrastructure and low literacy persist, requiring strategic interventions aligned with Digital India and NEP 2020.

The integration of digital technologies into nearly all spheres of social and economic life has fundamentally altered how individuals access information and public services. Participation in education, governance, healthcare systems, and employment markets increasingly depends on access to digital platforms and competencies. Despite substantial technological advancement, access to digital resources remains uneven, resulting in persistent disparities between regions, social groups, and levels of technological proficiency (van Dijk, 2020).

Libraries have historically been institutions committed to providing equitable access to information. In the contemporary digital environment, this commitment extends beyond print collections to include the provision of digital infrastructure, electronic resources, and technology-mediated learning opportunities. As a result, libraries have emerged as important institutional actors in efforts to reduce digital exclusion, particularly in communities where private access to technology is limited.

Objectives of the Study

- a) To explore the key dimensions of the digital divide in the context of a technology-driven society.
- b) To examine the evolving role of library services in addressing digital exclusion.
- c) To identify major challenges faced by libraries in delivering digital inclusion services.
- d) To analyze strategic responses adopted by libraries in India to mitigate the digital divide.
- e) To highlight the potential of libraries as community-based digital service centres.

Methodology

The paper adopts a descriptive and interpretative research approach based on secondary sources. Data were drawn from scholarly publications in library and information science, reports issued by international organizations such as UNESCO, IFLA, OECD, and the World Bank, and policy documents published by the Government of India. Relevant literature on national initiatives, including the Digital India programme, the Common Service Centres scheme, and the National Education Policy 2020, was reviewed. The collected material was analyzed thematically to identify recurring challenges, institutional responses, and best practices related to digital inclusion through library services.

Understanding the Digital Divide

The digital divide is not limited to physical access to technology but reflects multiple, interrelated forms of exclusion.

(a) Inequitable Access to Digital Infrastructure

Limited availability of computers, reliable internet connectivity, and uninterrupted power supply continues to affect large segments of the population, particularly in rural and economically weaker regions. Without shared public access points, individuals in these areas are unable to engage with digital services related to education, governance, or employment (World Bank, 2021). Libraries help mitigate this barrier by offering free access to essential digital infrastructure.

(b) Deficits in Digital Skills

Access to technology alone does not guarantee meaningful use. A lack of digital competencies often prevents individuals from effectively navigating online environments. “Digital literacy encompasses the ability to search, evaluate, and apply information using digital tools” (UNESCO, 2018). Libraries address this gap by offering guided training, hands-on assistance, and informal learning opportunities.

(c) Limited Availability of Relevant Digital Content

Digital participation is further constrained when online content is not available in local languages or culturally appropriate formats. This challenge is particularly significant in linguistically diverse societies. Libraries contribute to inclusive access by curating multilingual digital collections and supporting the preservation and digitization of local knowledge resources (OECD, 2019).

(d) Social and Economic Consequences

Digital exclusion has implications for educational attainment, employment opportunities, access to welfare services, and civic participation. When access to digital resources is uneven, existing social inequalities are reinforced. Libraries function as “equalizing institutions by providing shared access to digital opportunities and trusted information support” (IFLA, 2020).

Libraries as Agents of Digital Inclusion

The role of libraries has endured a significant transformation in response to the rapid expansion of digital technologies and the growing reliance on online information systems. No longer limited to the custodianship of printed materials, modern libraries have evolved into technology-enabled learning environments that actively promote digital inclusion. By providing equitable access to digital infrastructure, fostering digital literacy, and supporting community engagement, libraries function as critical agents in narrowing the digital divide and enabling inclusive participation in the digital society.

(a) Provision of Equitable Digital Access

One of the most fundamental ways libraries contribute to digital inclusion is by offering free and open access to digital infrastructure. Public access computers, high-speed internet connectivity, Wi-Fi services, printers, scanners, and assistive technologies are increasingly available in public and academic libraries. These facilities are especially vital for individuals who cannot afford personal digital devices or internet subscriptions, including students from economically disadvantaged backgrounds, unemployed youth, senior citizens, and rural populations. By serving as shared access points, libraries ensure that economic status does not become a barrier to digital participation (IFLA, 2020).

Libraries also address accessibility needs by incorporating “inclusive technologies such as screen readers, magnification software, and adaptive keyboards. Such provisions enable persons with disabilities to engage with digital content independently” (Afif & Musyaffa, 2025), reinforcing the library’s role as an inclusive public institution aligned with principles of equity and social justice.

(b) Facilitating Digital Literacy and Skills Development

Access to technology alone does not guarantee meaningful digital engagement. Recognizing this, libraries actively promote digital literacy through structured and informal learning programmes. Digital literacy initiatives offered by libraries typically cover basic computer operation, internet navigation, use of email and social media, online safety, and information evaluation skills. These programmes are particularly beneficial for first-generation digital users and individuals with limited formal education.

Librarians play a central role in delivering these initiatives by acting as instructors, mentors, and facilitators. Through workshops, one-on-one assistance, and community training sessions, library professionals help users develop the competencies required to use digital tools effectively. This instructional role positions libraries as lifelong learning centers that “support continuous skill development in response to evolving technological demands” (UNESCO, 2018).

(c) Supporting Access to Education and Lifelong Learning

Libraries significantly enhance access to digital education resources by providing electronic books, online journals, educational databases, and open educational resources (OERs). These resources support formal education at all levels as well as informal and self-directed learning. Students who lack reliable internet access at home rely on libraries to access online learning platforms, digital classrooms, and examination portals.

In the context of national education initiatives, such as India’s National Education Policy (NEP) 2020, libraries serve as community-based learning hubs that complement institutional education systems. By facilitating access to digital repositories like the National Digital Library of India (NDLI), libraries reduce educational disparities and promote inclusive learning opportunities for diverse user groups (Ministry of Education, 2020).

(d) Enabling Access to e-Governance and Public Services

As governments increasingly deliver services through digital platforms, libraries have emerged as important intermediaries between citizens and e-governance systems. Librarians assist users in accessing online government portals for services related to identity documentation, welfare schemes, employment registration, healthcare, and education. This support is particularly crucial for users who are unfamiliar with digital interfaces or apprehensive about online transactions.

Libraries hosting Common Service Centres (CSCs) or similar digital service units exemplify this expanded civic role. By combining technical infrastructure with human support, libraries ensure that digital governance initiatives remain accessible, transparent, and inclusive. This function strengthens democratic participation by enabling citizens to exercise their

rights and access public services independently (Government of India, 2020).

(e) Promoting Social Inclusion and Community Empowerment

Libraries operate as trusted, neutral, and non-commercial spaces within communities. This institutional trust enables them to engage marginalized populations who may otherwise be excluded from digital initiatives. Women, senior citizens, migrant workers, and minority groups often feel more comfortable seeking assistance in libraries than in private service centres.

Through community-oriented programmes such as digital literacy camps, youth technology clubs, and senior citizen training sessions, libraries foster confidence and digital self-efficacy among users. These initiatives contribute not only to individual empowerment but also to broader social inclusion by enabling participation in digital communication, online civic forums, and cultural exchange.

(f) Librarians as Digital Facilitators and Knowledge Mediators

The professional role of librarians has expanded significantly in the digital age. Beyond traditional reference services, librarians now serve as digital facilitators, guiding users through complex information environments. They assist users in evaluating the credibility of online information, avoiding misinformation, and understanding ethical issues related to data privacy and digital citizenship.

This mediating role is particularly important in an era characterized by information overload and the proliferation of unreliable online content. By promoting critical information literacy, librarians help users become informed and responsible digital citizens capable of making evidence-based decisions (IFLA, 2020).

(g) Strengthening Community-Level Digital Participation

Through their integrated services, libraries support sustained digital participation at the community level. Access to technology, skills training, educational resources, and civic services collectively enables individuals to engage more fully in economic, educational, and social activities. Libraries thus contribute to community resilience by equipping citizens with the tools needed to adapt to technological change.

In this capacity, libraries align closely with national and global digital inclusion goals, including the United Nations Sustainable Development Goals related to education, reduced inequalities, and inclusive institutions. By embedding digital inclusion within their core services, libraries reinforce their relevance as dynamic public institutions in the digital era.

Libraries function as vital agents of digital inclusion by combining infrastructure, expertise, and community engagement within accessible public spaces. Through equitable access to technology, digital literacy education, support for e-governance, and the mediation of digital knowledge, libraries enable individuals to overcome barriers to digital participation. As

technology continues to reshape society, strengthening libraries' digital capacities will be essential for fostering inclusive development, informed citizenship, and social cohesion.

Challenges and Strategic Responses

Indian libraries face funding shortages, inadequate ICT infrastructure (e.g., unreliable internet in rural areas), staffing deficits with untrained personnel, and low digital literacy among users. Rural-urban disparities exacerbate these, limiting e-resource access and multilingual content. Policy gaps in implementation further hinder modernization.

Financial Constraints: A persistent challenge for libraries is limited and uneven funding, particularly in rural and semi-urban areas. Insufficient financial resources limit investment in digital infrastructure, licensed electronic content, and staff training, resulting in uneven service quality across regions (Rao & Babu, 2017).

Strategic Response: Government-supported funding mechanisms, such as those implemented by the Raja Rammohun Roy Library Foundation (RRRLF), have facilitated the modernisation of public libraries by supporting computerisation and digitisation initiatives. Aligning library development with broader national digital programmes has further strengthened institutional support.

Infrastructure Limitations: Many libraries continue to operate in facilities that lack adequate space, connectivity, or technological equipment. These limitations reduce their ability to function as effective digital service centres.

Indian Case Example: The placement of Common Service Centres (CSCs) within public libraries in states such as Kerala and Karnataka illustrates an effective response to infrastructural constraints. CSCs provide access to online government services, digital financial transactions, and application portals. When housed within libraries, these centres leverage existing public infrastructure and institutional trust, thereby expanding digital service delivery at the local level (Government of India, 2020; MeitY, 2021).

Professional Skill Gaps: Rapid technological change requires library professionals to update their competencies continually. However, "opportunities for structured professional development remain limited, particularly in emerging areas such as digital pedagogy and data ethics" (Satija, 2018).

Strategic Response: Capacity-building initiatives associated with the National Digital Library of India (NDLI) have provided training and orientation programmes that enhance librarians' ability to support users in accessing large-scale digital collections (NDLI, 2022). Strengthening continuing education frameworks is essential for sustaining digital services.

Limited Community Engagement: In many regions, libraries remain underutilized due to limited public awareness of available digital services.

Social barriers, including low digital confidence and gender-based access disparities, further reduce engagement.

Indian Case Example: The Kerala public library movement demonstrates how sustained community outreach, digital literacy campaigns, and participatory programmes can improve awareness and usage of library services, particularly among women and senior citizens (Nair, 2019).

Policy and Institutional Positioning: Libraries have not always been fully integrated into national digital and education policy frameworks, limiting their strategic visibility.

Policy Context: The National Education Policy 2020 emphasizes digital infrastructure, open educational resources, and lifelong learning. Libraries support these objectives by functioning as learning resource centres that facilitate access to digital content and educational platforms (Ministry of Education, 2020). Strengthening policy recognition of libraries enhances their ability to contribute to national digital inclusion goals.

Conclusion

The digital divide poses a major challenge to equitable societal participation in India. Libraries, despite hurdles like limited funding, outdated infrastructure, and skill gaps among staff and users, are evolving into key digital inclusion hubs through modernization programs and community outreach.

Sustained investments in ICT upgrades via public-private partnerships will bolster reliable access, while targeted training for librarians and patrons builds essential digital competencies. Integrating multilingual e-resources, offline solutions, and schemes like Digital India, alongside accessibility policies for marginalized groups, positions libraries as vital enablers of informed citizenship and reduced disparities. This strategic evolution supports India's inclusive growth in the present era powered by artificial intelligence.

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Role of Remote Access Services in Crisis Management: Perceptions and Expectations of A.C. Joshi Library Users

Shahzeb
Preeti Mahajan

Abstract

The primary objective of this study is to assess library users' perceptions and expectations of Remote Access Services (RAS) following COVID-19 at the A.C. Joshi Library, Panjab University, Chandigarh. The COVID-19 pandemic caused an unprecedented crisis that severely affected the functions of academic institutions worldwide. During this period, RAS became an important part of how academic libraries deal with crises. The increasing number of COVID-19 cases and the enforcement of a statewide lockdown shifted the educational system to online learning. Moreover, all types of libraries were equally affected. This study discusses the continuity of remote access services that enable users to access academic library resources anywhere, anytime via Knimbus, MYLOFT, and RemoteXs, among others. It also explores their future expectations from such services, which offer them diverse electronic resources. The study employed a questionnaire method to get data from the research scholars at Panjab University, Chandigarh. Data were collected through a structured questionnaire from 100 respondents, out of which 72 responses were received. After analysing, the chi-square test and t-test were used to explore relationships among factors such as gender, age, education, users' perceptions, and expectations. The findings revealed that most users were aware of RAS. The study is limited to users of the A.C. Joshi library, which provides a snapshot of remote access services.

Keywords: A.C. Joshi Library, Panjab University, COVID-19, Pandemic, Remote access services (RAS)

Introduction

The swift growth of Information and Communication Technology (ICT) has greatly impacted libraries. It has transformed them from traditional to digital systems, where almost all tasks are performed on computers. As a result, the role of libraries has shifted from being service-oriented to user-oriented. Emerging technologies have been integrated into library science. This shift has led to digital, hybrid libraries, libraries without walls, and Library 2.0 (Basumatary, 2020; Mittal, 2017; Santosh, 2017). Libraries are implementing emerging technologies, including Artificial Intelligence (AI), Big Data, Library Service Platforms (LSPs), and Remote Access Services (RAS) (Chingath, 2020; Liu & Shao, 2024). The advent of the Internet and its web services have necessitated that libraries adopt such technologies. Keeping in view the requirements of their tech-savvy Generation Y and Z clientele, who have grown up in the era of online networking, are constantly hooked to their electronic devices, and require information instantly, a sea change in digital evolution has been observed in libraries. Apart from acquiring physical

resources, libraries are now acquiring online resources such as e-books, e-journals, databases, etc., and, accordingly, are providing online services on-campus as well as off-campus, along with their physical services. Furthermore, the role of libraries has shifted from mere repositories of books to collaborative learning centres, offering a supportive environment for the joint use of resources.

Such a role for libraries became all the more important and necessary in the wake of the COVID-19 pandemic. Before the pandemic, users regularly visited libraries to take advantage of their services and access their resources (Dube & Jacobs, 2022). In response to the pandemic, educational institutions worldwide were compelled to suspend their physical library services and transition to online platforms to maintain library service provision for their users (Fasae et al., 2021). Hence, significant changes to library services occurred as a direct result of the pandemic (Davies, 2020). The integration of physical services into online services has led to a significant increase in e-resources supporting online education (Green, 2022). To accomplish this task, library management sought an innovative service that provided information in a manner appropriate for library users (Baikady et al., 2014). The pandemic transformed how library users access resources through remote logins, and remote access has emerged as the leading platform for e-resources. This research explores the users' perceptions and expectations about RAS. Nowadays, the efficiency of library services has become increasingly dependent on the availability of easily accessible information and user-friendly remote access tools and services (Dadhe & Dubey, 2020). As RAS provide convenience to access the library's e-resources without the boundaries of time and geographical area, the demand for such services has increased manifold, especially in large academic libraries.

Remote Access Services (RAS)

A remote access (off-campus) service is very important for the secure handling of network or device resources from any location at any time (Hewlett Packard Enterprise, 2023; Ruambo et al., 2025). It allows users to use the information resources when the physical library is closed (Jagadish & P, 2018). At present, providing a remote access service is the most effective method for optimizing the utilization of the library's electronic resources. The effectiveness of service is now significantly associated with the availability of accessible information and user-friendly RAS. This study discusses three remote access services Knimbus, MYLOFT and RemoteXs.

The characteristics of certain remote access services are described below:

i) Knimbus is a collaborative knowledge platform that connects users to communities and relevant resources (K= Knowledge + Nimbus = Cloud) (Indraji & Dominic, 2024). It provides a collaborative workspace and a

federated search engine for users, making it a valuable tool for scholars to explore and retrieve millions of articles and e-books subscribed to by libraries. It is a cloud-based platform that facilitates the discovery and sharing of scholarly content from any location at any time. It has become popular and is now used by more than 1000 institutions (Gulati et al., 2025; Knimbus, 2026). It is a cloud-based platform that allows library users to access and preserve their subscribed content using login credentials. The Knimbus mLibrary is a mobile application that provides access to e-resources through smartphones; it is a cloud-based application that works on iOS and Android operating systems, facilitating the comprehensive digitization of institutional libraries (Sangeetha & Vasantha, 2024).

ii) MyLOFT (My Library on Fingertips) application was officially introduced by Eclat Engineering Pvt. Ltd, based in Ahmedabad, at the IFLA conference (Oyelude, 2019). It is specifically developed for Smartphone utilization. MyLOFT is designed to synchronize with users' workflows, enabling them to effortlessly discover library-subscribed resources (Unik, 2021). This platform allows users to access the library's e-resources remotely at any time, providing greater flexibility in accessing the library's resource base with login capability from three devices simultaneously (Yuvashree et al., 2025).

iii) RemoteXs is a cloud-based platform that integrates an institution's e-resources, such as e-journals and e-books, into a single accessible location (Shakya & Nyaichyai, 2022). It predominantly facilitates remote access for its user community and allows users to access resources at anytime from anywhere. Since the COVID-19 pandemic, RemoteXs has become an essential for academic libraries by supporting ongoing off-campus academic activities (Ansari & Ali, 2023; Sumi & Kumar, 2020). Additionally, it is a cost-effective service that provides secure access to scattered institutional e-resources, bringing them under one umbrella (Kurapati, 2025).

Review of Literature

The literature review focuses on the role of academic library services during the COVID-19 pandemic. The pandemic enhanced the importance of RAS, prompting libraries to swiftly adapt to meet users' changing needs. Verma et al. (2022) suggested that central university libraries in India enhance their websites to enable remote access to institutional resources and implement plagiarism detection tools. The libraries of Central University of Orissa, Aligarh Muslim University, and the University of Delhi offered premium library services through their websites during COVID-19. Most of the libraries that were chosen had OPACs, gave information about plagiarism detection tools, and showed UGC activities during COVID-19 for online learning, remote access to e-resources, etc. Similarly, Begum and Elahi (2022) demonstrated the shift of East-West University in Bangladesh from physical to digital services through the implementation of advanced remote access

technologies and online information literacy training during the COVID period and offered remote access facilities, federated search solutions, web-based catalogues, etc. Ansari and Ali (2023) indicated that Indian Institutes of Management implemented various remote access systems like RemoteXs, EZProxy, Open Athens and VPN to keep access available, with each institute customizing authentication protocols for security purposes. Dube and Jacobs (2023) emphasized that leading Indian technological universities embraced digital platforms, using AI and other innovations to enhance accessibility and user engagement. These studies emphasise that libraries' rapid digital services highlight the enduring need for comprehensive web-based services, the necessity to prepare users for remote learning, and the anticipation that many digital advances will remain vital post-pandemic. The research mentioned above indicates that, to improve access to library materials during the shutdown, academic libraries initiated remote access services for their users. It has enabled users to use subscribed electronic resources for study and research while maintaining social boundaries. Since that time, remote access has evolved into a comprehensive interface for accessing all subscription electronic resources. This study examines the comparative usage of the remote access services offered by the A.C. Joshi Library at Panjab University.

Objectives of the study

The study aimed to evaluate the perceptions and expectations of A.C. Joshi Library users concerning the remote access services. The main objectives of the study included:

- a) To analyse the current usage of services provided by the A. C Joshi library.
- b) To examine the state of awareness about RAS among users of the library.
- c) To examine the state of perceptions about RAS among users of the library.
- d) To examine the state of expectations about RAS among users of the library.

Hypotheses

- H₀₁: There is no significant difference in the extent of awareness of RAS among PhD scholars based on their year of study.
- H₀₂: There is no significant difference in the extent of perceptions of RAS among PhD scholars based on their year of study.
- H₀₃: There is no significant difference in the extent of expectations of RAS among PhD scholars based on their year of study.

Methodology

The research was empirical, and a survey method was used to achieve the study's aims. The data were collected from library users (research scholars) at A.C. Joshi Library, Panjab University, Chandigarh, India. Random sampling was employed, and 100 users were selected. The data was gathered through the Questionnaire method, which was distributed personally.

A total of 72 responses were received, comprising 40 males (55%) and 32 females (45%). The majority of respondents were aged 26–30 years, followed by 36% in the 21–25 age group and 8% in the 31–35 age group. In terms of academic discipline, 61% belonged to Arts and Humanities, 28% to Sciences, and the remaining 11% to Commerce.

Most respondents (38%) had been engaged as research scholars for three or more years, while 31% were in their second year of research. The remaining 31% were in their first year as research scholars.

Findings

The findings of the study on the perceptions and expectations of remote access services users of A.C. Joshi Library (P.U.) are given below:

Frequency of visit A. C. Joshi Library

Table 1 depicts the frequency of library visits by respondents from A.C. Joshi. It is observed that 50% of the students visit the library every day, and the remaining 50% have no fixed time for visiting the library.

Table 1: Frequency of library visits

Frequency	N	Percentage
Everyday	36	50%
Once a Week	0	0%
No Fixed Frequency	36	50%

Awareness about Services offered by the A.C. Joshi Library

As evident from Table 2, more than 90% reported the availability of access to e-journals, e-periodicals and newspaper service, followed by a high level of response for access to online databases (85%), OPAC/Web OPAC (83%) and Internet/Wi-Fi (83%). Similarly, the library website (67%) and the notice board (62%) were known to a large proportion of respondents. 51% of respondents used overnight reading room service. 21% of respondents were aware of photocopying and printing facilities, a news clipping service, writing support tools, and reference management tools and services provided by their library.

Table 2: Awareness about Library Service

Awareness about Library Service	N
Access to e-journals & e-periodicals	94%
News Clipping Service	94%
Newspaper Service	85%
Internet/Wi-Fi	83%
OPAC/WebOPAC	83%
Library Website	67%
Notice Board	62%
Writing Support Tools	62%
Overnight Reading Room Service	51%
Plagiarism Detection Tools	24%
Reference Management Tools	23%
Photocopying and Printing Facilities	21%

Level of Awareness about RAS

Table 3 presents the level of awareness of RAS among the respondents. The data reveal that a majority of the respondents, 36 (50%), were moderately aware, followed by 14 (19%) who were not aware of the service. Additionally, 11 (15%) respondents were slightly aware, while only 4 (6%) were somewhat aware of the RAS.

Table 3: Level of Awareness

Level of Awareness about RAS	N	%
Not at All	14	19%
Slightly Aware	11	15%
Somewhat Aware	4	6%
Moderately Aware	36	50%
Extremely Aware	7	10%

Familiarity with RAS

Table 4 reflects the percentage of respondents' familiarity with various RAS. Although 47 (70%) respondents were familiar with remote access services (i.e., Knimbus) being provided by their library, followed by 24 (41%) respondents who were familiar with RemoteXs, and 12 (21%) were familiar with MyLOFT.

Table 4: Familiarity with RAS

Remote Access Services	Yes		No	
	N	%	N	%
Knimbus	47	81%	11	19%
MyLOFT	12	21%	46	79%
RemotXs	24	41%	34	59%

Perceptions regarding efficacy of remote access services

Table 5 presents respondents' perceptions of the efficacy of RAS. Most participants (44, 61% agree; 17, 24% strongly agree) believe RAS allows access anytime, anywhere. Similarly, a substantial proportion of users perceived it is effective for library space optimisation (42, 58% agree; 12, 17% Strongly Agree). When asked about bringing resources together in one place, 41 (57%) agreed and 17 (24%) strongly agreed, while 13 (18%) were neutral and only 1 (1%) strongly disagreed. For usability, 32 (44%) agreed, and 26 (36%) strongly agreed that the RAS interface is easy to use, indicating high satisfaction; 13 (18%) were neutral, and 1 (1%) strongly disagreed. Additionally, 17 (24%) respondents were neutral, while 1 (1%) strongly disagreed. Overall, the findings indicate that a majority of research scholars perceive RAS as effective, especially for accessibility, resource integration, ease of use, and space optimisation.

Table 5: Efficacy of RAS

Perceptions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Accessibility anytime, anywhere	1 (1%)	0 (0%)	10 (14%)	44 (61%)	17 (24%)
Bringing resources under one umbrella	1 (1%)	0 (0%)	13 (18%)	41 (57%)	17 (24%)
Interface is easy to use	1 (1%)	0 (0%)	13 (18%)	32 (44%)	26 (36%)
Library space optimization	1 (1%)	0 (0%)	17 (24%)	42 (58%)	12 (17%)

**The respondents could indicate multiple issues*

Future expectations of users from remote access services

Table 6 presents respondents' expectations regarding remote access services. Most respondents indicate "Likely" or "Very Likely" across all variables. Alerts and notifications are significant for 76% of respondents. Citation downloading for research papers is also valued, with 68% expressing favourable expectations. A notable 35% remain neutral, which may reflect dependence on external citation tools. The highest level of consensus concerns the need for a secure, dependable library connection from off-campus, with 92% anticipating this feature. Security and continuous access are key concerns. Similarly, 82% of participants expect robust user support services, emphasising the need for assistance with digital platforms. The findings show strong demand for secure, accessible library service systems in digital academia.

Table 6: Expectations towards RAS

Expectations	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
Alerts and notifications	0 (0%)	1 (1%)	16 (22%)	46 (64%)	9 (12%)
Citation downloading provision for research paper	0 (0%)	0 (0%)	25 (35%)	34 (47%)	13 (18%)
Easy remote access to all tools on the web & mobile through a single sign-on	0 (0%)	0 (0%)	15 (21%)	32 (44%)	25 (35%)
Provide a secure and reliable connection to library resources from off-campus locations	0 (0%)	4 (6%)	8 (11%)	30 (42%)	30 (42%)
Provide support Services (help desk, technical support, FAQ)	0 (0%)	4 (6%)	11 (15%)	34 (47%)	23 (32%)

**The respondents could indicate multiple issues*

Testing of Hypotheses:

Awareness towards remote access services

Table 7 presents the calculated values of Mean, Standard Deviation, f-value and *p*-value for the extent of awareness of library users towards remote access services.

The calculated value in Table 6 also indicates that the difference between the 1st year (Mean=39.82, SD=7.38), 2nd year (Mean=41.45, SD=5.65) and 3rd year and above (Mean=42.89, SD=3.46) research scholars regarding their awareness towards RAS is not statistically significant, as the calculated f-value = 1.883, *p* = 0.16. There is no significant difference in the awareness of RAS between 1st year, 2nd year and 3rd year research scholars.

Hence, it is concluded that the null hypothesis H01: There is no significant difference in the awareness of RAS among PhD scholars based on their year of study is accepted.

Table 7: Statistical validity of awareness of remote access services

Year of Research	N	Mean	SD	Std. Error	f-value	p-value
1st Year	22	39.82	7.38	1.57	1.883	0.16
2nd Year	22	41.45	5.65	1.20		
3rd Year & Above	28	42.89	3.46	0.65		

SD = Standard Deviation

Perception towards remote access services

Table 8 presents the calculated values of Mean, Standard Deviation, f-value and *p*-value for the extent of perception of library users towards remote

access services.

The calculated value in Table 8 also indicates that the difference between the 1st year (Mean=15.55, SD=3.143), 2nd year (Mean=15.73, SD=2.394) and 3rd year and above (Mean=16.82, SD=1.541) research scholars regarding their perceptions towards RAS is not statistically significant, as the calculated f -value = 2.147, p = 0.125. There is no significant difference in the efficacy of RAS between 1st year, 2nd year and 3rd year research scholars.

Hence, it is concluded that the null hypothesis H02: There is no significant difference in perceptions of RAS among PhD scholars based on their year of study is accepted.

Table 8: Statistical validity of the perception of remote access services

Year of Research	N	Mean	SD	Std. Error	f -value	p -value
1st Year	22	19.73	3.383	.670	2.147	0.125
2nd Year	22	20.23	2.287	.510		
3rd Year & Above	28	20.29	1.997	.291		

SD = Standard Deviation

Expectations towards remote access services

Table 9 presents the calculated values of Mean, Standard Deviation, f -value and p -value for the extent of expectations of library users towards remote access services.

The calculated value in Table 9 also indicates that the difference between the 1st year (Mean=19.73, SD=3.383), 2nd year (Mean=20.23, SD=2.287) and 3rd year and above (Mean=20.29, SD=1.997) research scholars regarding their expectations towards RAS is not statistically significant, as the calculated f -value = 0.33, p = 0.72. There is no significant difference in the expectations of RAS between 1st year, 2nd year and 3rd year research scholars. Hence, it is concluded that the null hypothesis H03: There is no significant difference in expectations of RAS among PhD scholars based on their year of study is accepted.

Table 9: Statistical validity of expectations towards remote access services

Year of Research	N	Mean	SD	Std. Error	f -value	p -value
1st Year	22	19.73	3.383	.721	0.33	0.72
2nd Year	22	20.23	2.287	.488		
3rd Year & Above	28	20.29	1.997	.377		

SD = Standard Deviation

Conclusion

The libraries faced the challenge of survival during the Covid-19 lockdown, and to adhere to social distancing norms, almost all the academic libraries started offering remote access services, which allowed their users to access their subscribed e-resources for education and research without the

limitation of time and boundary through their user-friendly web portal/interface. Such services have become ‘new normal’ services post-pandemic. The study highlights the awareness, perceptions and future expectations of the library users regarding the remote access services being provided by their library, which have become increasingly vital in the current ICT scenario, particularly post-pandemic. The results of the study indicate that the services offered by A.C. Joshi Library do provide a user-friendly interface, enabling their users to access a diverse range of e-resources from any location, thus enhancing their overall experience. To maximise the benefits, it is essential for academic libraries to actively engage users through awareness programs and orientation sessions, ensuring that all potential users are well-informed about the system’s functionalities and advantages. Such programmes will be beneficial to academic users in the long run as they will enhance user engagement and satisfaction. The libraries should educate their users about the technical aspects, services, and different types of e-resources available. Moreover, the libraries should remain committed to improving their networks and address any challenges their users encounter while utilizing remote access services, especially the network and other related technical issues. Such efforts will ensure that all users utilize the remote access services provided by their libraries judiciously, as huge amount is spent on their acquisition.

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Decoding Audience Sentiments on the ‘Mann ki Baat’ Radio Broadcast Using Data Mining Approaches

**Maya Deori
Irene Lalruatkimi
Manoj Kumar Verma**

Abstract

The popularity of any government depends on the ability to communicate with the common people and that effectively conveys its policies, initiatives, and future goals. Political leaders around the nation employ a variety of communication techniques to engage with the public and inform them of their endeavours. Prime Minister of India Shri Narendra Modi chooses radio podcasts as a medium to reach out to the common people through the programme ‘Mann ki Baat’ since it is a significant communication medium that transmits podcasts to remote areas - villages, districts, and cities. In order to connect with as many people as possible, the “Mann ki Baat” programme is also broadcasted on several social media sites, including YouTube. And, the present study deals with the contents of the videos of Mann ki Baat uploaded on the YouTube channel National Doordarshan and the analysis of the comments posted by the listeners. The analysis of all the comments revealed that Mann ki Baat is a direct radio programme that fosters a link between the people and the PM himself. A larger number of comments are heavily concentrated on PM Modi rather than the content of the programme. Numerous residents make use of this channel to express their joy, rage, and enthusiasm. This research offers recommendations to investigate the critical comments of ordinary men to improve the environment in which they dwell.

Keyword: Radio; Sentiment Analysis; Netizen comment; Podcast; Government

Introduction

Mass communication existed since the beginning of time and has always been an integral part of verbal and non-verbal communication. Mass media has undergone significant change over time from being a tool for general interaction into a universal platform for social information sharing where individuals are able to communicate oneself (Wings, 2021). Numerous mass media medium has emerged over time had a profound impact on the communications technological, financial, socioeconomic, and cultural tendencies of every country. Likewise, radio was marked as an efficient and popular communication medium over the globe during the 19th century. In that centennial, radio was a common household fixture used for either news or entertainment purposes (Mihalis, 2019). Yet, the advancement of digital world has greatly diminished the usage of radio. However, the emergence of Information and Communication Technology (ICT) and digital media have radically altered the radio listening landscape into a new radio broadcasting behaviour. Nowadays, classic radio broadcasters routinely broadcast their programmes and interact with their listeners via online media called podcasts. Regardless of the financial situation, everyone has unrestricted

access to the radio because of its remarkable capacity to act swiftly and immediately (Gandhi & Balamurugan, 2017). Therefore, Prime Minister Narendra Modi of India launched a novel media campaign called “Mann ki Baat”, which was broadcast on All India Radio from October 2014 to connect with common people (Upadhyay & Upadhyay, 2019). Prime Minister Shri Narendra Modi was officially consummated on May 30, 2019, the first day of his tenure for the second term. He also previously presided over India as prime minister from 2014 until 2019. Shri Modi has brought about a paradigm shift in governance that has resulted in a comprehensive, development-focused, and corruption-free administration, prompted by the mantra “Sabka Saath, Sabka Vikas, Sabka Vishwas”. Along with several initiatives and policies, PM Modi launched Mann Ki Baat on All India Radio, a monthly programme where he discusses programmes and policies for country-wide articulation, challenges, and a variety of other concerns. The phrase ‘Mann ki Baat’ is in Hindi language, the national language of India which generally means ‘Speaking my Heart’ (Sabaraju, 2022). The show is always hosted in Hindi language which appeals to a large portion of the population who are not fluent in English. The PM utilises the show to spread awareness of strategies, regulations, conflicts, etc., and it always concentrates on the theme that is presently making headlines. Its distribution and audience participation are impressive because it covers the maximum public through radio, YouTube channels, websites, Apps and other platforms. PM Modi has also claimed and requested the audience to broadcast this programme as a non-political event for the countrymen to build a bridge between them (Deora, 2017).

Since, Mann ki Baat has been broadcasted on a large scale by PM Modi himself to the audiences therefore analysing the programme content and its comments becomes very much necessary to know what information is being provided in the programmes and how the audiences are enheartening and what actually matters to audiences. The scope of this study is confined to the videos and comments of Mann ki Baat initiated and anchored by present honourable Prime Minister Shri Narendra Modi since October 2014 displayed in the National Doordarshan on YouTube. The political review expressions analysis provides great insights to understand the public mood and mind. The digital platform like YouTube provides a very enormous opportunity to the public to express the digital traces, like clicks, views, likes, comments, etc., which became the new metrics to understand the public sentiment in the age of algorithms.

This study aims to provide a fresh viewpoint of the public’s reception to the Mann ki Baat program, with a special emphasis on users’ comments broadcasted by conducting a content-driven sentiment analysis. Sentiment analysis is an opinion mining approach or technique that distinguishes between pleasant and unpleasant opinions about a good or service by utilising statistical, artificial intelligence, and natural language processing

methods and strategies (Pak & Paroubek, 2010). It is also a phenomenon to explore whether the audience's engagement is more particularly directed to the thematic content of the program or on the PM himself. And by incorporating real time user data segments for the sentiment and intention analysis, it tries to present factual and detailed insights into the use of participatory digital spaces by political leaders. The findings of the study will be useful for the political leaders, analyst, news agencies and organizer of the such type of the program. The study will offer novelty through its approach and methods in prompting the juncture of political communication between leaders and common people by analyzing its digital content along with viewers' sentiment and intention patterns on a social media platform.

Literature Review

Various researchers have strived their focus on the programme Mann ki Baat by producing numerous research articles and news articles, eyeing on different aspects of the radio programme. Jayachandran (2016) summed up 16 episodes of Mann ki Baat highlighting the various initiatives undertaken by the government which PM Modi creating awareness in the programme such as the Prime Minister Crop Insurance Scheme, Soil Health Card for farmers and agricultural sectors; Mudra Yojana, Gold Monetisation Scheme for financial management. To know the real time potential and satisfaction of the listeners, Gandhi and Balamurugan (2017) surveyed among 200 respondents shared through google docs/forms about the programme Mann ki Baat hosted by PM Narendra Modi where most of the respondents were satisfied (good, 48.60%). Maheshwari and Khanna (2019) did exploratory research by distributing a questionnaire as well as content analysis of 10 episodes of the programme to specify the major issues, personalities mentioned, and festival importance which highlight that each issue has been picked with consideration, and the triumphs that enhance the public perception of the in-power administration are emphasized. Sharma and Dubey (2021) explained the usage of Motivating Language Theory (MLT) on the radio programme Mann ki Baat by Modi revealing that Modi has been employing motivating language demonstrating empathy, creating significance, to a pretty efficient level, improving his motivation and performance. Kaur and Mishra (2020) conducted a content analysis of Mann ki Baat episodes specially on Covid 19 that reveals that the nation was able to control its resources and obtain time for preparedness on the front of the health sector thanks to PM Narendra Modi's appeals to the public on several instances to battle Corona, in addition to his efforts to raise awareness of its dangers. Sambaraju (2022) studied Modi's political rhetorical concern on adhering to COVID 19 permissible practices because the data demonstrate that Modi expresses guidelines and options for implementing these in terms of anticipated national service. Kaur and Mishra (2022) intend to analyse the Mann ki Baat

program's content on 24 chosen broadcasts through NVIVO. Many studies have been carried out on the programme Mann ki Baat based on Covid 19, political views, motivational language analysis and also numerous content analyses of the episodes. One of the earliest comprehensive studies of Mann Ki Baat was carried out by Garg (2019), who used natural language processing (NLP) on Twitter replies and broadcast transcripts. Makwana and Ganatra (2022) curated Mann ki Baat programme concentrating on content from March 2020 to February 2021 intended to deliver hierarchical clustering, sentiment and thematic word-cloud visualizations using statistical modelling during the pandemic era. However, there is no sign of evaluating the sentiments, emotions and intentions of the comments posted in the programme Mann ki Baat to exactly know the thoughts of the people regarding the program. By means of the free Webometric Analyst and Mozdeh software, Thelwall (2018) presented the Comment Term Frequency Comparison (CTFC) approach as social media analytics to assess YouTube comments. This paper evaluates specific research concerns or parameters regarding YouTube comments, such as the methods for determining gender, sentiment specifications, and networks of relationships between themes, and it explains how to get the responses utilising Mozdeh along with a variety of explanations and visual representations.

Likewise, through sentiment analysis, the customers/audiences can reveal their true acceptance of the product or service that has been provided to them. It can expose the real-life user-satisfaction value of the consumers so the manufacturers have the opportunity to improve and modify the product/service.

Objectives

- a) To know the distribution of videos engraved in the programme Mann ki Baat
- b) To display the distribution of comments posted by the viewers on the YouTube National Doordarshan channel
- c) To exhibit the time series graph of the comments posted by the audiences in the programme Mann ki Baat
- d) To analyze the sentiment, intention and emotion of the English comments on Mann Ki Baat videos
- e) To analyse the top words frequency within the comments

Methodology

The analysis of the sentiments of the comments from Mann ki Baat episode will directly provide a view of the opinion of people towards PM Modi as well as the programme. Mann ki Baat programme is being displayed on many platforms viz. radio channels and many sites such as www.narendramodi.in, <https://pmonradio.nic.in/>, www.pmindia.gov.in and many more. However,

this platform does not provide the opportunity for the common people to share their feedback regarding the programme since this is the only programme where PM Modi is directly interacting with common people through social media networks every month. The YouTube channel National Doordarshan is the key channel to show the radio programme in vodcast format for the audience where the viewers have the privilege to share their opinions in the form of comments. A total of 123 numbers of videos were found in the name of Mann ki Baat programme initiated on August 7, 2013. But the first 26 videos were hosted and elaborated as a talk show manifesting on different socio-economic issues of the country and humanity. Later from October 2014, Prime Minister Modi started hosting the programme moving up to 97 numbers of videos until the date of data collection i.e., October 3rd, 2022.

Fig. 1: Step-wise display of the processes of data collection and data analysis

STEPS	PROCESS	SOURCES/ SOFTWARE
Step I	Selecting the regional YouTube channel to provide full-episode	National Doordarshan
Step II	Acquiring the video Id from each episode manually	Source Page
Step III	Retrieving the YouTube API key	Google Cloud Console
Step IV	Retrieving the basic details of the videos through video IDs as query	Webometrics Analyst
Step V	Extracting the comments posted to videos via through video IDs as query	Webometrics Analyst
Step VI	Manually weeding out the non-English language comments	3937 no. of comments
Step VII	Analysis of Sentiment, intention and emotion was	ParallelDots.com
Step VIII	Extraction of Top word frequency and gender based top users to post comments	Mozdeh

The video Ids for data collection were retrieved from the HTML file of the web page of each video by searching the video Id (annexure 01) on the source page. The extraction of video details and comments was done from the software Webometric analyst (<http://lexiurl.wlv.ac.uk/>) by dotting the video

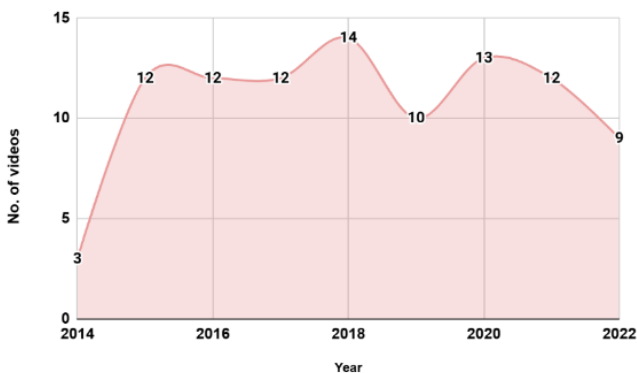
Ids as query. Later, after mining out only English language comments ($n=3937$), the analysis of sentiment, intention and emotion was carried out with the help of the online site Paralleldots.com/Komprehend.io (<https://komprehend.io/>). The paralleldots.com service works as an add-on service implemented in Google Spreadsheet by executing the designated functions/formula (Deori et al., 2021). For top word frequency and top user stat, Mozdeh (<http://mozdeh.wlv.ac.uk/>) software has been used (Deori et al., 2022). The analysed dataset is interpreted in meaningful interaction through various charts, tables and graphs with the help of Tableau, Google Spreadsheet, MS-Excel. And for visualization of the top word frequency, Worditout (<https://worditout.com/>) has been used.

Data Analysis and Interpretation

Year-wise distribution of videos of Mann ki Baat

Fig. 2 shows the year-wise distribution of videos of the programme hosted by PM Modi. The Mann ki Baat programme has been started since August 07, 2013 on the National Doordarshan YouTube channel where certain knowledgeable personalities catch up on one topic for each episode on sociological and psychological issues of society. However, PM Narendra Modi started hosting the show later in October 2014 which has reached up to 97 numbers of videos until September 2022 producing one episode each month. Yet in certain months, the number of videos increases to two episodes per month. In 2018, in the month of November, three episodes were broadcast and the Hindi version of the show Mann ki Baat was telecasted in October 2019. Nonetheless in 2020, a special episode was broadcast in the month of July in sign language for the specially disabled people to encourage them during the harsh situation of Covid 19. In January 2015, PM Modi hosted the programme along with the then-US President Barack Obama.

Fig. 2: Year-wise distribution of the videos of Mann ki Baat uploaded by National Doordarshan



Duration of the videos

Table 1 displays the duration of videos of Mann ki Baat hosted by honourable Prime Minister Modi. The duration of videos is divided into a ten minute intervals where 31-40 minutes has the maximum number (64) of videos followed by 21-30 minutes with 27 numbers of videos. However, the first interval i.e., 0-10 minutes does not have videos. And the lengthiest video is about one hour twenty-three minutes which is a special telecast celebrating the completion of 50th episode of Mann ki Baat hosted by PM Modi entitled “Mann ki Baat: Sab ke Saath”, yet still it does not have many views and likes unlike other sets of videos. The length of the video is also a key element that helps the audience to decide whether to absorb by the video or not. The table indirectly reflects that the longer period of videos does not attain much grip over the audiences.

Table 1: Duration of the selected Mann ki Baat videos

Duration	No. of videos	View count	Like count
0-10 minutes	0	0	0
11-20 minutes	4	55575	1109
21-30 minutes	27	471163	10429
31-40 minutes	64	3162892	86277
41-50 minutes	1	15445	443
51-60 minutes	0	0	0
61-70 minutes	0	0	0
71-80 minutes	0	0	0
81-90 minutes	1	2932	71

Resolutions of the selected videos of Mann ki Baat

Within the two defined resolution criteria, the videos are mostly broadcasted in high-definition (HD) with 62 videos while the rest 35 videos are in standard definition (SD). The picture quality in HD is outlined to have more clarity and vision of the imaginings rather than the SD. The SD resolution was grasped for visualization during the first initial years i.e., 2014 (3 videos), 2015 (9 videos), 2016 (3 videos), 2017 (12 videos) 2018 (7 videos) and 2019 (1 video). However, the espousal of HD resolution has grown faster since 2015 to until now. The distribution of HD resolution over the years is represented as 2015 (3 videos), 2016 (9 videos), 2018 (7 videos), 2019 (9 videos), 2020 (13 videos), 2021 (12 videos) and 2022 (9 videos). The none broadcasted episodes are in live and all the episodes are in 2-dimensional view.

Comment Assessment of videos

Table 2 presents the assessment of the highest number of comments extracted from the software Webometric Analyst of each video ids as a query. A total of undertaken 97 videos of Mann ki Baat have induced a number of 16943 comments within the date of data extraction i.e., October 3rd 2022. The

episode of 20th August 2020 of PM Narendra Modi's Mann Ki Baat has attained the maximum number of comments with 4693 comments followed by the episode of PM Narendra Modi's 16th Edition of Mann Ki Baat 2.0 on 27th September 2020 with 2863 comments and PM Narendra Modi's Mann Ki Baat - 26th April, 2020 with 1832 comments. The maximum number of comments that have been extracted by the queries is seen in the immediate years like 2020 and 2021. This can be because of two reasons either the programme has gained more recognition over the years of continuous telecast or the audiences are enhancing more on the importance of social media power. On the other hand, the preceding years like 2015, 2014 have the minimum number of comments.

Table 2: Top videos to attain maximum comments

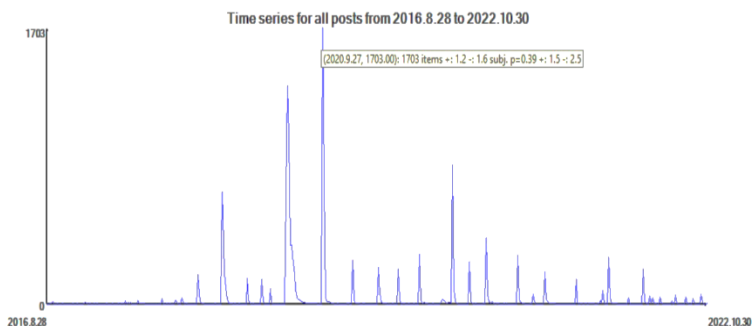
Video Name	Video ID	Date of publication	No. of comments
PM Narendra Modi's Mann Ki Baat	gQURE9PWM1U	August 30th 2020	4693
PM Narendra Modi's 16th Edition of Mann Ki Baat 2.0	hXQ8rP3Z8Q0	September 27th 2020	2863
PM Narendra Modi's Mann Ki Baat	gbrjxmeCHKg	April 26th 2020	1832
PM Narendra Modi's 21st Edition of Mann Ki Baat 2.0	CrxhyPALEbo	February 28th 2021	839
PM Narendra Modi's Mann Ki Baat	Cc4ELRvKauA	June 28th 2020	577
PM Narendra Modi's 23rd Edition of Mann Ki Baat 2.0	nYuPX-gSxA	April 25th 2021	529
PM Narendra Modi's 83rd Edition of Mann Ki Baat	6zoTT5Yhs7E	November 28th 2021	387
PM Narendra Modi's 18th Edition of Mann Ki Baat 2.0	FZIX-n_Z4qY	November 29th 2020	384
PM Narendra Modi's Mann Ki Baat	c0Lugly96H8	May 31st 2020	378
PM Narendra Modi's 24th Edition of Mann Ki Baat 2.0	QYI2N36Aq38	May 30th 2021	370

Time series representation of the comments

Fig. 3 demonstrates the time series graph of the comments extracted from the queries. The graph represents the post of comments by the audiences per day and the graph was created on October 30, 2022, from the software Mozdeh. The spike of the graph reveals that on that particular day i.e., September 27, 2020, the comments posted to the video PM Narendra Modi's 16th Edition of Mann Ki Baat 2.0 have led to a maximum extent of 1703 comments. And the second spike is shown on September 01, 2020, with 1039 comments to the video PM Narendra Modi's Mann Ki Baat on August 30,

2020. The shape of the graph represents the upside-down U-shape which reflects that the middle year videos have received the maximum attention and comments from the audiences specially in the year 2020 the key prevalence of Covid 19 virus and lockdown.

Fig. 3: Time series graph of the comments



Identification of Top Commenters

Table 3 picks out the top commenters amongst the audiences in the selected videos of Mann ki Baat categorizing into gender outlook. Amongst approximately three million viewers of the programme Mann ki Baat in National Doordarshan YouTube channel, only 16943 comments have popped out in the comment section. Yet the majority of the commenters from the audiences have not defined or unidentified their gender while creating their own YouTube channel. Only 1.33% of the commenters have identified themselves as male (225 commenters) and female (226 commenters), while the rest 97.34% commenters unidentified their gender as a result of which they belong to the category 'Undefined' with 16492 commenters. Rita Patil is the top commenters in female category with 11 posts uploaded in the comment section while Mohammed Saifulla H is the top commenters in the male category by only commenting 6 post all total. But Swadha Nandy is the one to grab the top position as commenter in the undefined category with 35 posts in all 97 videos of Mann ki Baat hosted by PM Modi.

Table 3: Display of Gender-based Top Commenters

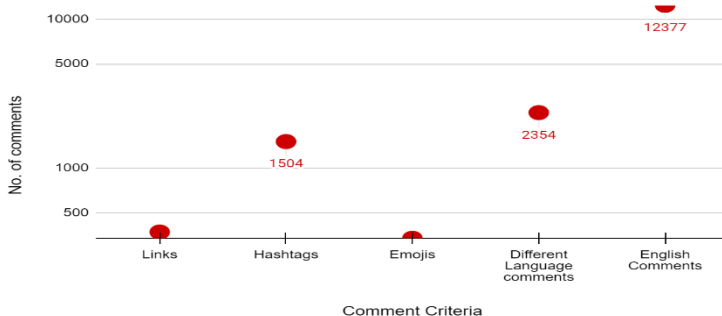
Gender Category	Rank	User	No. of post
Female	1st	Rita patil	11
	2nd	Vicky Kumar	7
		Usha Ravi	
Male	1st	Mohammed Saifulla H	6
	2nd	Jack Sparrow	5
		prince general knowledge	
Undefined	1st	Swadha Nandy	35
	2nd	Ehtesham Mohammed	22

Categorizing the Variety of Comments

Fig. 4 exhibits the comments posted by the audiences to the videos of selected Mann ki Baat programme in a variety of categories. The comments have been induced to each category by observing the framework of the comments manually. The comments have been divided into five categories such as links, hashtags, emojis, variety of other languages and English comments. Of all the extracted comments, the comments with emojis are the least in numbers with only 337 comments and the second least is the comments with links (371 comments) where the majority of the links are the YouTube links that are mostly irrelevant to the programme. The hashtags category has a strong prevalence in the overall comments with 1504 in numbers. In the hashtags (#), most of the comments were about “Rojgar” or “Employment/Job” and certain comments were specifically mentioned as “#speakupforSSCrailwaystudents” and “#stopuppclprivitization” and some of hashtag’s comments were focusing on the supporting the farmers.

The English comments have the highest prevalence over all the comments with 12377 comments that have been classified accordingly later in Fig. 6. However, the category of variety of languages has another level of significance all over the comments with 2354 comments. The various languages that are seen in the comments are mostly Indian Languages such as Hindi, Punjabi, Tamil, Telugu, Gujarati, Kannada, Bangla and Malayalam. Despite being an Indian show, there were certain foreign language comments in Thai, Urdu and Burmese which signifies that the Mann ki Baat broadcast hosted by PM Modi has gained recognition at an international level. However, for the study of the sentiment, emotion and intention, only English comments shall be accepted.

Fig. 4: Distribution of variety of criteria in comments posted by the audiences

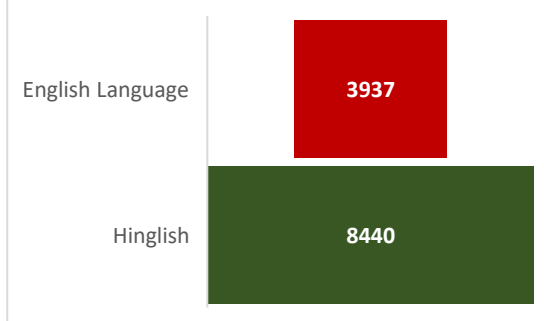


Classification of English Comments

Fig. 5 penetrates the display of the variation of language intrigue in the English language comments. The English language comments have been classified into two different categories based on the recognised formal language i.e.,

English Language and Hinglish. The English language is the comments where terms or sentences have English meanings. While according to Oxford Languages, Hinglish is an informal language which is a combination of Hindi and English, particularly a form of English used by Hindi speakers that frequently uses Hindi vocabulary or grammar. Hinglish began to gain recognition in the 1960s, where an Indian author Shobha De began using a language in her works combining both languages i.e., Hindi and English. Amongst 12377 comments identified English language, 8440 (68.19%) comments are in Hinglish language and only the other 3937 (31.81%) comments are purely in English language. Anyhow, to study the sentiment, intention and emotion of the comments, only the English Language comments (3937 comments) are undertaken since the tool (paralleldots.com) which is used to analyse the sentiments does not support multiple languages other than English. Yet the statistics of the comments reveal that average Indians primarily prefer Hinglish over English.

Fig. 5: Variation of comments in terms of English language

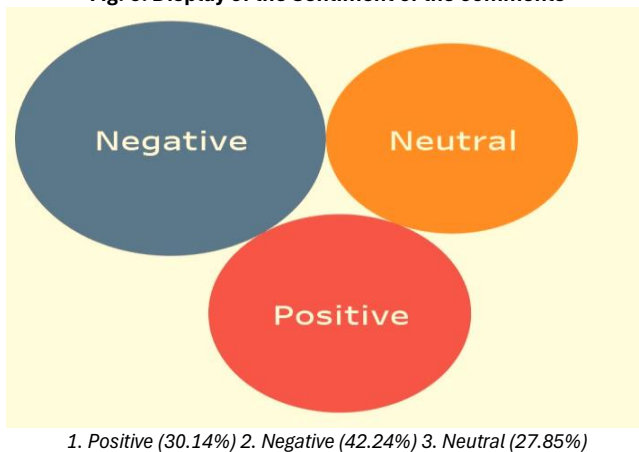


Sentiment of the comment

Fig. 6 depicts the sentiment of the extracted English comments from the programme Mann ki Baat. The sentiments of the comments are analysed by using the online site paralleldots.com also called as Komprehend.io. About 1184 (30.14%) comments were interpreted to have positive sentiments regarding the programme and PM Modi as a host. The audiences with positive comments are proud and support PM Modi. From all the 3937 comments, most of the comments are seen to have negative sentiments with 1659 (42.24%) comments that represent that the audiences are unhappy or unsatisfied. The audiences or common people chose the programme Mann ki Baat as a platform to share their disappointment with PM Modi and his government. Most of the negative sentiments portray their unhappiness regarding certain issues such as unemployment of youth, corruption, inflation, economy of the country, and privatization of government organizations like hospitals, airports and many more. Some of the viewers are

depressed with PM Modi due the unsolved problem of farmers. The comments with neutral sentiments (1094 comments; 27.85%) are the comments which are either irrelevant to the context or request to PM Modi that do not consist of any positive and negative terms such as 'speak on job', 'speak for students', 'speak for SSC railway exam' and many more. The evaluation of the sentiment shows that the comments are more about PM Modi rather than the programme Mann ki Baat itself.

Fig. 6: Display of the Sentiment of the comments

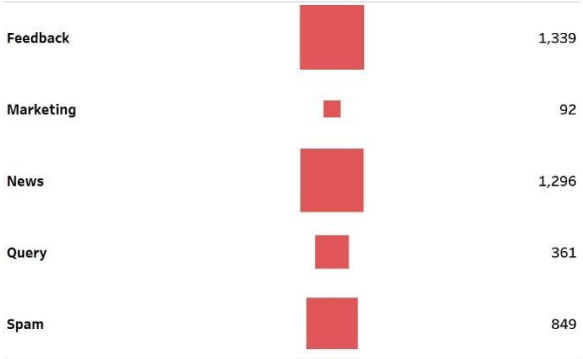


Intention of the comments

Fig. 7 represents the intention of the viewers towards posting the comments in the videos of Mann ki Baat. The analysis software Paralleldots.com already put ahead the five-default categorization of intentions such as feedback, marketing, news, query and spam. These five intentions can provide a clear view about the main motive of the commenters towards the content of the videos. From all the undertaken English comments, it is found that most the viewers are eager to convey their feedback with 1339 (34.09%) comments. The feedbacks can be either positive or negative like asking for help from the PM, appreciating the PM and also trying to reveal the actual situation of the common people. Feedback is then followed by news with 1296 (32.99%) comments where the audiences acknowledge the schemes and policies while requesting the PM to take interest in the unemployment condition of the youth and its corruption. The spam (849 comments, 21.61%) comments are either irrelevant for the study or the comments does not give any clear meaning to the sentences. The category of query (361 comments, 9.19%) represents the phase where the audiences ask explanations about certain issues as such declaration of results for both employment and examination of students; about unemployment; lockdown; privatisations and policies to

PM Modi. The category with the least numbers of comments is Marketing (92 comments, 2.34%) which generally advertise of products and promotion of YouTube channels or make positive comments about the PM Modi.

Fig. 7: Distribution of the Intention of the comments



Emotion of the selected comments

Fig. 8 reveals the emotions of comments by analysing the comments of the selected videos of Mann ki Baat through Paralleldots.com into six different categories. The emotions of the comments disclose the distinctive feeling of the audiences. The maximum comments of the audiences are angry with 34.83% followed by happy (24.82%) emotions. The angry emotions of the audiences depicted the unsatisfactory and unhappiness about the strategies or tactics used by PM Modi to run the government and mostly about unemployment. The happy emotion of the comments shows the respect and love for PM Modi as well as the programme Mann ki Baat. The Excited (16.80%) category is about both being supportive comments and request comments for some changes to PM Modi; and the next following emotion is sad (13.34%), fear (5.93%) and bored (4.51%). Most of the emotions of the comments are gloomy and fuming about PM Modi and his decisions regarding the strategies to run the government as well as the programme Mann ki Baat.

Depiction of the Top words

Fig. 9 illustrates the most frequently used words in the comments on the videos. Word frequency is a compilation of classified sets of words that are ranked by how frequently they appear in the corpus, which aids in identifying the bustle and trend of comments on YouTube content. The software Mozdeh was used to extract the top 1000 terms where the software’s home page displays a drop-down menu of analysis options and individuals can click on the Analyze tab. Clicking List of top words will provide two text files, one containing the entire list and the other with 1000 top words, where the top

terms and the frequency of occurrence have been documented. The demeaning keywords are eliminated manually, and use WordItOut (<https://worditout.com/>) to showcase the top 160 terms. The Fig. reveals that the term 'Modi' is most frequently used by the audiences with 1971 frequency. Most of the other commonly used terms are 'berojgari' meaning 'unemployment'; 'rojgar' meaning employment; exam; bharaat; Indian; election and many more key elements. This top frequently depicted word shows the actual view and concern of the audiences towards PM Modi and his strategies.

Fig. 8: Determination of different emotions of the selected comments

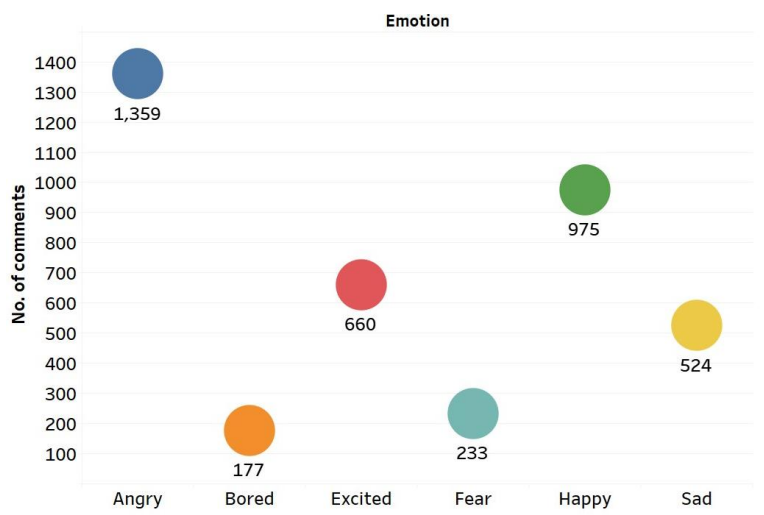


Fig. 9: Top word frequency of the comments



Conclusion

Sentiment analysis has given new perceptions to different services, products and organizations by giving out actual people's view on it. Since, countless consumers use the Internet and social media to express their ideas, thoughts, emotions, and life events. Nevertheless, closer examination reveals that most of these opinions and emotions are useful; for instance, the majority of commercial enterprises and political campaigns rely on gathering information about public viewpoints and sentiments via social media and evaluating if they are neutral, negative, or good (Aqlan, 2019). Likewise, the present tried to sum up people's opinion from the comments of YouTube videos of Mann ki Baat hosted by PM Modi. The Mann ki Baat was basically started in August 2013 however, PM Narendra Modi began to host the radio programme later October 2014 and since then only 97 videos. Mostly the duration of videos

were about 31-40 minutes with 64 videos which had the maximum view counts 3,162,892 and likes counts of 86,277. Majority of the Mann ki Baat videos in the National Doordarshan channel of YouTube are in high definition (HD) rather than standard definition (SD) resolution. During the time series analysis of the comments, on the date of 27th September 2022 maximum number of comments have been posted by the audiences. The categorization of the comments exposes that maximum number of comments are in English whether it is in pure English language or Hinglish. The mining of all the comments has shown that a greater number of comments are focused on PM Modi rather than the Mann ki Baat programme since it is a direct radio programme that builds a connection between the people and the PM himself. And the people take this platform as an opportunity to speak out their happiness, anger and excitement. However, the analysis of the sentiments of the English comments reports that most of the audiences have negative opinions about the strategies and policies of PM Modi of how he governs the country. The anger of the audiences is mainly regarding the unemployment of the youth which has been highlighted in Hinglish language also. The study gives out a statement for the policy makers and the government/PM Modi as well to check out the grievances of the common people to make it a better place to live.

The study also had certain limitations while accomplishing the processes of the methodology. Since the software/site (paralleldots.com) used for analysing the sentiment, intention and emotion did not have the efficiency to support multiple language and it also could not detect sarcasm used by the commenters who posted comments on the videos of Mann ki Baat. The incompetency of the tool to analyse the Hinglish language has brought out a bigger section of the comments to be unable to make any definite statement. The inefficiency of the analysing tool has certainly pushed the result of the comments to differ a bit, however the evaluation of the English comments

made out a clear indication about the opinions and feeling of the audiences. The present study provides ample scope for further studies of sentiment analysis on different speeches delivered by important key persons like presidents, prime ministers and other high-profile political leaders across the globe which will provide the common people's feelings and sentiments on those particular speeches. To determine the precise information on such important speeches time to time such studies are very important and necessary.

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Annexure I: List of queries (Video Ids) for data extraction

S.N	Video name	Video Ids
1	Mann Ki Baat	h7wdQxzcDyU
2	Mann Ki Baat	PSDI28ecRjc
3	Mann Ki Baat	jMVU3BAE914
4	Mann Ki Baat	3b-SaC3z6sk
5	Mann Ki Baat	lNlgldgXsg0
6	Mann Ki Baat	ZMOqSloYmXc
7	Mann Ki Baat	3cAfgoY-S6M
8	Mann Ki Baat	TB0HjAkBQEU
9	Mann Ki Baat	Aj__dcdk1b0
10	Mann Ki Baat	RTF__OaewLPM
11	Mann Ki Baat	6zoTT5Yhs7E
12	Mann Ki Baat	IsCrcn0MMW8
13	Mann Ki Baat	-MwETmoKq0I
14	Mann Ki Baat	nmKbVmT-KMs
15	Mann Ki Baat	tUYW6YH1Ky4
16	Mann Ki Baat	S5h8NAXh_cl
17	Mann Ki Baat 2.0	QYL2N36Aq38
18	Mann Ki Baat 2.0	-nYuPX-gSxA
19	Mann Ki Baat 2.0	4N3F5dKRuyo
20	Mann Ki Baat 2.0	CrxhyPALEbo
21	Mann Ki Baat 2.0	9Y0cWk5FwF4
22	Mann Ki Baat 2.0	0XcnfWKO9XA
23	Mann Ki Baat	BRnrBuN5Gkc
24	Mann Ki Baat 2.0	FZIX-n_Z4qY
25	Mann Ki Baat	Z2inBzVsmjg
26	Mann Ki Baat 2.0	hXQ8rP3Z8Q0
27	Mann Ki Baat	gQURE9PWM1U
28	Mann Ki Baat	9qaYDrveSKU
29	Mann Ki Baat: With Sign Language	hvN_oSLDgCc
30	Mann Ki Baat	Cc4ELRvKauA
31	Mann Ki Baat	c0Lugly96H8
32	Mann Ki Baat	gbrjxmeCHKg
33	Mann Ki Baat 2.0	ZwGs8p2-63c
34	Mann Ki Baat	yEzXeH4U_KY
35	Mann Ki Baat	UrIsuFNSD-w
36	Mann Ki Baat	xyHnsw9zmPU
37	Mann Ki Baat	qfum4H3nVOA
38	Mann Ki Baat	XieypZtNLLw
39	Mann Ki Baat	lMeJ3ELvrdg
40	Mann Ki Baat	-19nW78l0ec
41	Mann Ki Baat	xw6XeZ7kiuE
42	Mann Ki Baat	1ywj9FRMTg
43	Mann Ki Baat: New India Sankalp / Part 100	7QyeY8YyffA

S.N	Video name	Video Ids
44	Mann Ki Baat: Sab Ke Saath	-4BjRNVZZ8k
45	Mann Ki Baat	RL93BI8rX88
46	Mann Ki Baat	DMK82O65zEQ
47	Mann Ki Baat	O_PMpkiwwec
48	Mann Ki Baat	nQBG0n_Pb3l
49	Mann Ki Baat	hSvoAuOZzOY
50	Mann Ki Baat	0Fh66U-wnPc
51	Mann Ki Baat	k_jxJRb1Gxk
52	Mann Ki Baat	RB02xYxWhQQ
53	Mann Ki Baat	kshW6Aa-2a4
54	Mann Ki Baat	uN4koPonJBA
55	Mann Ki Baat	mjGPNesjPzE
56	Mann Ki Baat	iRK6xZk8KII
57	Mann Ki Baat	w6BP2nbKCrI
58	Mann Ki Baat	X0m1E7QA2Hs
59	Mann Ki Baat	Fz0P6CShcVk
60	Mann Ki Baat	FTqWFwfsAul
61	Mann Ki Baat	VPBhe8so_WQ
62	Mann Ki Baat	tJK0iEIXRj8
63	Mann Ki Baat	pgAJIZQ-EDg
64	Mann Ki Baat	x2cDapZd0sc
65	Mann Ki Baat	teGBajAAHx0
66	Mann Ki Baat	4CwejrRp88VA
67	Mann Ki Baat	M_7iKXvIcnA
68	Mann Ki Baat	kWXJIRWLzJk
69	Mann Ki Baat	kIK5C1oegcg
70	Mann Ki Baat	fAVWq4UnUlc
71	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	aXQCcHkB2bk
72	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	IOoTN8_KiYo
73	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	MJoNqX4LiXM
74	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	PoHuVvbdob8
75	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	2DdlpdF9zIQ
76	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	U9yclk66fEY
77	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	m-9-BQGMt28
78	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	0AdF7Q_LXK0
79	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	uHZp6EVQ5nQ

S.N	Video name	Video Ids
80	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	s1sPrhDz9D4
81	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	l5hkPRxO9-8
82	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	wWtSjDgq4pc
83	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	8pBVqZr9i90
84	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	r1FSzXGRdSs
85	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	w73YWUrsBCI
86	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	nUCCgGODbXM
87	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	DE4Zyv74WcU
88	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	NXhjtlgqqzs
89	Mann Ki Baat	0kTpHqfDhWk
90	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	kg1vMsSHv00
91	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	9iV_MfBERjU
92	Mann Ki Baat with farmers	LtwB1m2yez0
93	Mann Ki Baat: Prime Minister Narendra Modi shares some thoughts with us	tr0dyX_G5Lc
94	Mann Ki Baat: Prime Minister Narendra Modi and US President Barack Obama	kNBwx1Rvj08
95	Mann Ki Baat: PM Narendra Modi shares some thoughts with us	9ezZaDJMQYI
96	Mann Ki Baat: PM Narendra Modi shares some thoughts with us	vUkm1wOmF0E
97	Mann Ki Baat: PM'S FIRST ADDRESS TO NATION ON AKASHWANI	hiCzNdT5a88

Annexure II: Distribution of comments according to each video IDs

SN	Video ID	No. of Comments	SN	Video ID	No. of Comments
1	0AdF7Q_LXK0	1	50	lMeJ3ELvrdg	6
2	0Fh66U-wnPc	6	51	lNlgldgXsg0	27
3	0kTpHqfDhWk	0	52	LtwB1m2yez0	8
4	0XcnfWKO9XA	290	53	M_7ikXvlcnA	1
5	-19nW78l0ec	6	54	m-9-BQGMt28	1
6	1ywjD9FRmtg	1	55	mjGPnesjPzE	11

SN	Video ID	No. of Comments	SN	Video ID	No. of Comments
7	2DdlpdF9ziQ	1	56	MJoNqX4LiXM	1
8	3b-SaC3z6sk	78	57	-MwETmoKq0l	34
9	3cAfgoY-S6M	54	58	nmKbVmT-KMs	226
10	-4BjRNVZ8k	1	59	nQBG0n_Pb3l	0
11	4CwejRp88VA	4	60	nUCCgGODBxM	0
12	4N3F5dKRuyo	338	61	NXhjtIgqqzs	1
13	6zoTT5Yhs7E	387	62	-nYuPX-gSxA	529
14	7QyeY8YyffA	2	63	O_PMpkjwec	6
15	8pBVqZr9i90	0	64	pgAJIZQ-EDg	1
16	9ezZaDJMQYI	4	65	PoHuVvdbob8	2
17	9iV_MfBERjU	0	66	PSDI28ecRjc	43
18	9qaYDrveSKU	364	67	qfum4H3nV0A	31
19	9Y0cWk5FwF4	320	68	QYl2N36Aq38	370
20	Aj_dcdk1b0	236	69	r1FSzXGRdSs	4
21	aXQCcHkB2bk	4	70	RB02xYxWhQQ	3
22	BRnrBuN5Gkc	43	71	RL93BI8rX88	0
23	c0Lugly96H8	378	72	RTF_OaewLPM	50
24	Cc4ELRvKauA	577	73	s1sPrhDz9D4	6
25	CrxhyPALEbo	839	74	S5h8NAXh_cl	102
26	DE4Zyv74WcU	2	75	TB0HjAkBQEU	54
27	DMK82O65zEQ	5	76	teGBajAAHx0	1
28	fAVWq4UnUlc	8	77	tJK0iEIXRj8	2
29	FTqWFwfsAul	13	78	tr0dyX_G5Lc	6
30	Fz0P6CShcVk	11	79	tUYW6YH1Ky4	306
31	FZIX-n_Z4qY	384	80	U9yclk66fEY	1
32	gbrjxmeCHKg	1832	81	uHZp6EVQ5nQ	1
33	gQURE9PWM1U	4693	82	uN4koPonJBA	13
34	h7wdQxzcDyU	74	83	UrIsuFNSD-w	51
35	hiCzNdT5a88	0	84	VPBhe8so_WQ	2
36	hSvoAuOZZoY	24	85	vUkm1wOmF0E	13
37	hvN_oSLDgCc	41	86	w6BP2nbKCrl	13
38	hXQ8rP3Z8Q0	2863	87	w73YWUrsBCl	1
39	IOoTN8_KiYo	1	88	wWtsjdGq4pc	0
40	iRK6xZk8KIl	11	89	X0m1E7QA2Hs	6
41	IsCrcn0MMW8	98	90	x2cDapZd0sc	5
42	jMVU3BAE914	53	91	XieypZtNLLw	27
43	k_jxJRb1Gxk	11	92	xw6XeZ7kiuE	8
44	kg1vMsSHv00	2	93	xyHnsw9zmPU	70
45	klK5C1oegcg	20	94	yEzXeH4U_KY	77
46	kNBwx1Rvj08	10	95	Z2inBzVsmjg	343
47	kshW6Aa-2a4	5	96	ZMOqSloYmXc	55
48	kWXJIRWLzJk	3	97	ZwGs8p2-63c	326
49	l5hkPRxO9-8	1	Total	16943	



The Myths and Magic Behind Psychological Skills Training: A Narrative Review

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Harshteen Kaur Duggal**

Abstract

Following the COVID-19 outbreak, the sports sector has been profoundly challenged, with sportspersons' physical and emotional health suffering the most. Sportspersons have been confronted with challenges of social isolation, career disruption and restricted access to training amenities that negatively impact their physical and mental well-being and result in sub-par performance. The need for coherent measures to resume sporting activities, prioritizing the well-being of sportspersons, is clear. Our research aims to understand how the spread of Coronavirus and its aftermath has affected the mental health of sportspersons and how it can be improved with the help of appropriate psychological skills training.

Keywords: Psychological Skills Training, Mental Training, Mental Health, Sports

Introduction

Since its emergence, the COVID-19 outbreak metasized to nearly every nation on Planet. In an attempt to halt the virus's spread, lockdowns of companies, schools, and other public places become frequent. Myriad of daily life aspects were impeded by these restrictions, particularly sports (United Nations, 2020). Covid-19 tampered with routine sporting events and practices, forcing the rescheduling of prominent sporting events, including the 2020 Olympics (Dagnall et al., 2021). In a never-seen-before incident, the Olympics were rescheduled from 2020 to 2021, disrupting the traditional 4-year cycle for the first time in history as a consequence of the Covid-19 outbreak. Nobody could have predicted such far reaching consequences, such as rescheduling of Olympics and disruptions in trainings, of the global pandemic on sports persons. Due to these unanticipated circumstances, the COVID-19 outbreak is also referred to as a catastrophe filled with uncertainty. This unpredictability has been distressing for sports persons and their coteries (Leisterer et al., 2021).

Thus, our study aims to understand how the spread of Coronavirus epidemic is affecting the mental health of sports persons and how it can be improved with the help of appropriate psychological skills training. Covid-19 has not only caused physical health concerns but has also lead to severe psychological issues to people around the world (Fu et al., 2021). Suspension of sporting events has impeded individual and team training of players and has adversely affect the mental health of sports persons during their time in isolation and transition to return to competition (Mulcahey et al.,

2020). The most prevalent psychological effects to COVID-19 have been reported as anxiety, depression, and increased stress (van Agteren et al., 2020). The prime example of the psychological distress experienced by sportspersons is the world champion American gymnast Simone Biles. At the Tokyo 2020 Olympics, the four-time gold medalist gymnast Simone Biles decided to drop out early owing to her mental health (Maine, 2021), corroborating that sports persons confronted with challenges of social isolation, career disruption and restricted access to training amenities faced a negative impact on their well being, resulting in sub-par performance (Mulcahey et al., 2020).

Mental training is an essential integrant of any sporting tutelage (Mudian et al., 2021), and sport psychology practitioners are well placed to assist sports persons in dealing with these unexpected challenges (Leisterer et al., 2021). Fear and pressure in sports persons often lead to overthinking which impairs their performance (Ninan, 2022). As a result of high perceived stress, this performance anxiety, sometimes known as “choking,” debilitates sports performance. Sports persons who choke and succumb to performance pressure must realize that this perception and idea can be shaped via suitable mental training (Palazzo & Arnaud, 2013). For sports persons, the ability to “Switch Thoughts” is a vital mental capability (R., 2022). People place too much emphasis on players’ physical abilities, failing to see that mental capabilities are as important. If not more, the mental aspect of sports is as crucial as the physical part of the game (Hansen, 2015). Psychological skills training (PST) is just as vital as physical training for sports persons, and it can account for 50-90 percent of sports performance. The four most common PST approaches used by sports persons are goal setting, self-talk, mental imagery, and relaxation. They must be studied, developed, and exercised by the player, much as technical or tactical parts of a sport (Singh et al., 2020).

Psychological and emotional factors determine whether a player gains or loses momentum. In a matter of seconds, a player might restore or lose psychological control. This psychological volatility can be avoided with good psychological training and emotion regulation in order to deal with unfavourable stimuli (Athletics Training, 2022). Studies on Psychological Skills Training (PST) reveal that PST ameliorates mental resilience while also amplifying perceived self efficacy, positive affect, and self esteem in sports persons. This lends credence to the beliefs that Mental Toughness is teachable and that PST can enhance psychological well-being (Dagnal et al., 2021). Because each sports person has unique sports requirements, psychological skill development, orientations, and experience, each PST programme must be tailored to that player (Chee, 2018). Appropriately designed intervention packages can further improve one’s emotional intelligence. Sports persons with better emotional intelligence may change

their emotional state to comply with whatever is needed for the situation at present (Margolies, 2022).

Mental resilience is a key factor for any player to achieve a gold medal performance; it is something a sports person dthe pandemic and its aftermath on sports persons' psychological health is therefore an issue that merits research. Mental Health has traditionally been a taboo subject for sports persons. Many sports persons are of the opinion that being silent about their psychological issues is preferable to rejection and worries about their performance (Malvone, 2021). COVID-19 virus, and any other crisis that follows, has had, and will remain to have extremely significant consequences on the sports industry and on physical and mental wellbeing of sports persons (United Nations, 2020).

Methodology

The present paper is a narrative review of the role of psychological skills training in improving the mental health of sports persons in the post pandemic era. A thorough and comprehensive exploratory search of available literature was conducted on various databases including Web of Science. Google scholar was also explored using keyword searches "psychological skills training", "mental training", "mental health", "covid*" OR "corona*", "resilienc*", "wellbeing", "pandemic" and "sports". Psychological skills training has been construed as a set of performance enhancement skills and techniques which are aimed to be performance oriented (Ford & Arvinen-Barrow, 2019). Manual searches of the reference lists which were found in the primary articles were also conducted. Given the limited number of studies in this area, a narrative review is considered more suitable than a systematic review (Mcuiiffe et al., 2021).

Literature Review

Ford and Arvinen-Barrow (2019) define PST is a set of performance enhancement skills and techniques which are aimed to be performance oriented. PST is commonly defined as the methodical application of arousal control, concentration, confidence, goal setting, imagery, motivation, and self-regulation to boost efficiency (Ford & Arvinen-Barrow, 2019). It works both within and outside of the performance environment. The term psychological skills training (PST) was coined to describe approaches used to educate or enrich psychological abilities that assist in performance and facilitate a positive attitude towards sport competition. A key concept of PST is that sports persons are generally mentally healthy, but they may require cognitive abilities and techniques to cope with the diverse demands of sport competition (Rameshpandian & Rajeswaran, 2021). Imagery, relaxation, and self-talk, for example, may be utilized to cope with combative tension, improve attentional control, and elevate self-confidence. An analogy that is

frequently used is that psychological talents, like physical skills, may be taught and learnt to a certain extent (Vealey, 1988).

PST comprises of three phases, (1) educational phase i.e. the understanding of PST, (2) acquisition phase i.e. how to use PST and (3) practice phase i.e. putting PST to practice. However, if the player does not comprehend then impact of PST on sports performance, PST is considered the least effective, thereby making the educational phase the most crucial part of PST (Brookfield, 2009). Thus, PST is an educational approach that views psychological skills as teachable (Vealey, 1988). The four fundamental mental strategies commonly practiced in sport psychology interventions are imagery, goal-setting, self-talk, and physical relaxation techniques, containing a mixture of these approaches (Vealey, 2007; Rothlin et al, 2016; Barker et al, 2020).

Adverse impact of isolation, caused by Covid-19, on sports persons include decline in mental skills such as concentration and motivation (Sugihartono et al., 2021). PST techniques such as relaxing improves an individual's attentional concentration while when making erroneous judgments or blunders in perception and decision-making. As a result, relaxing allows performers to maintain optimal levels of activation rather than experiencing sudden spikes as a result of mistakes. Imagery improves motivation and perceived competence by allowing performers to visualize themselves effectively accomplishing certain motor, perceptual, and decision-making tasks (Thellwell et al, 2006).

PST is largely derived from cognitive behavioural therapy. Land et al (2022) developed the Psychological Skill Inventory - Law Enforcement (PSI-LE) that measures several skills cardinal to PST namely, attention management, winning mindset, combat breathing, muscle control, mental practice, physical recharge and self talk. The study was orchestrated on 576 law enforcement officers. The success of the PST programme can be evaluated directly by comparing improvements in the application of psychological skills to programme results, such as resilience, job satisfaction, and wellbeing. First responders who engage in PST programmes are able to master a bundle of psychological skills to boost their sense of control and capability to manage stress and emotions under stressful conditions (Land et al, 2022). Additionally, inquiry into the viability, legitimacy, and effectiveness of recommending that a sports division coach get certified and overseen to administer cognitive ability programs is required, as Hut et al. (2021) indicate that coaches are possibly ideal for overseeing PST interventions considering their understanding of the coach-player dynamic (Hut et al., 2021). Thus, proper mental training has the capability to shape a sports person's perspective and cognition such that they do not succumb to pressure (Palazzo & Arnaud , 2013). The key to achieving peak performance in sports is mental resilience (Forrester , 2018), which can be built via appropriate

psychological skills training (PST). Various PST tactics such as goal setting, visualization, mental preparation, self-talk, and relaxation are used to build and strengthen psychological talents in order to refine performance and/or well-being. PST's prime purpose is to help people take back control of their thoughts and emotions. The method varies from performance to performer depending on the demands of each individual. There is no such thing as an ideal PST package; each programme is customized to the person's psychological state and the sport (Brookfield, 2009).

Conclusion

The prime objective of our study was to study the effects of the pandemic and its aftermath on the psychological well being and mental health of sports persons while also recommending corrective action in terms of PST to enhance athletic performance. The COVID-19 virus has had a tremendous effect on the sports sector and on the psychological and physical health of individuals. Sports persons have encountered, and continually confront, a wide range of psychological challenges and stressors, such as social isolation, career disruptions and de-training. The need to develop and enact coherent measures to resume and advance sporting endeavours in a manner that prioritizes the health and well-being of sports persons and the protection of coaches, staff and spectators, is clear. Imagery, Goal Setting, Relaxation and Arousal Management are four most prominent psychological skills training methods used by sports persons. PST can be used as a means to improve stress management in sports persons to cope with the anxiety, stress and mental pressure that comes with their sport, especially after the Covid-19 pandemic. Suitable mental training can aid sports persons to achieve optimum performance and will in turn develop resilient players. Mental resilience is a critical factor for any player to achieve a gold medal performance; it is not something a sports person inherits but must acquire through time.

Scope for Future Research

The COVID-19 virus has had, and is projected to have detrimental effects on the sports sector and individuals' mental and physical well-being. Given the paucity of research in this field, this study, on the detrimental effects of Covid-19 on sportspersons' psychological health is an issue that merits research. Sportspeople have endured and continue to face an array of psychological obstacles and hardships, especially considering that mental health has traditionally been a taboo subject for sports persons. Many players are of the opinion that keeping their psychological issues hidden is preferable to rejection and scrutiny about their performance. Therefore, the need to develop and enact coherent measures to resume and advance sporting activities, in a manner that prioritises sportspersons' mental health

is germane. To further strengthen the literature in this field and help sportspersons maintain psychological fitness, future studies must expand on the present study.

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Treading the Green Path at Panjab University Library (India)

Pragya Lohia
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Abstract

Over the years, climate change has become the world's largest environmental problem affecting every nation on a social and economic level. It has caused rise in sea levels, more frequent and severe weather events like hurricanes, droughts, and floods, which have lowered food production, interfered with ecosystems, impacted water supplies, and raised risks for various health related disorders. In terms of attaining the objectives of green buildings and sustainable development, India has been catching up to the western nations with persistent efforts at various policy development levels by creating plans for the construction and upkeep of green buildings. To address the environmental issues while planning and creating new facilities, buildings that utilise and consume energy efficiently while maintaining the comfort and productivity must be designed and developed, to be ecologically responsible. Green libraries or sustainable libraries are those that are built with environmental concerns in mind and use its resources, environmentally friendly and sustainable infrastructure, and public library services to educate the public about environmental issues. The goal of the current study was to examine the initiatives and current state of the green initiatives implemented by Panjab University in Chandigarh for both its departmental and central libraries (A.C. Joshi Library) with respect to its infrastructure as well as initiatives in the various sections. The study concluded that even though some attempts have been taken in this area, more efforts and further steps are required to achieve a completely functional green library to safeguard the interests of the patrons and planet Earth.

Keywords: Green Libraries; Sustainable Libraries; Green Buildings; Climate Change; University Libraries; Academic Libraries; Developing Countries; India

Introduction

Climate change

Climate change has become the biggest environmental challenge today, which has a broad social and economic impact on every country of the world, resulting in rising sea levels, severe and more frequent weather events such as hurricanes, droughts, and floods, leading to reduced food productivity, collapse of ecosystems, reduced water supply, increased health risks (Banholzer et al., 2014; Kopp et al., 2019; Mann et al., 2017; Sorensen et al., 2020). It is critical for the planet's survival and sustainable well-being to mitigate climate change. Hence, adaptation is necessary. As a result, all the countries of the world, along with various national and international organisations, have committed themselves to protecting the planet Earth from degradation. To fight climate change, numerous nations ratified the United Nations Framework Convention on Climate Change (UNFCC) in 1992.

It has established a financial mechanism to aid developing countries with assistance from the developed countries. The Kyoto Protocol is one of its universal action plans, which was adopted in 1997 and entered into force in 2005 (Kyoto Protocol, UNFCCC Website, n.d.). The Paris Agreement, which went into effect in 2016, was another example of this. Its goal was to improve nations' capacity to address the effects of climate change by providing suitable financial channels (UNFCCC, 2015). Most scientists worldwide now concur that the earth is experiencing extreme stress. Quoted as being 'unequivocal' by the Nobel Prize-winning Intergovernmental Panel on Climate Change, it has been concluded that human activities have been responsible for the temperature increase worldwide (Rosenthal & Revkin, 2007). Focusing on the increasing climatic hazards faced by the developing nations, the IMF in its World Economic Outlook report has urged developed countries to assist them so as to reduce the harm and the impact of climate change. Additionally, it has called on the international community to focus on institutional frameworks and policies, infrastructure investments, increased resilience, and other adoption strategies like technology innovation and activity diversification, in order to reduce the harm caused by increasing temperatures in hot countries (International Monetary Fund, 2017). The International Monetary Fund (IMF) estimates that governments around the world are spending \$5.5 trillion to properly account for the environmental harm caused by energy use. To assist low-income and vulnerable middle-income nations in becoming more resilient to external shocks, including long-term issues like climate change, the IMF established the Resilience and Sustainability Trust (RST) in 2022 (International Monetary Fund, 2022).

In the year 2019, among the countries affected by extreme meteorological phenomena attributable to climatic alterations, India was found to be ranked seventh (Hussain et al., 2024). Need of the hour is to improve green infrastructure for environmentally sustainable development through combined efforts of all such organisations, governments and every individual in any profession to combat the universal emergency of climate change.

Green Building Movement

In order to be environmentally responsible when designing and developing new facilities, buildings that use and consume energy efficiently ensuring the comfort and productivity of the people inhabiting them doesn't suffer, must be created. Provision of natural light, proper ventilation with clean air, and consideration for ergonomic requirements are characteristics of such structures (Boyden & Weiner, 2000). Poor environmental and economic conditions during childhood and adolescence, have life-long impacts on health (Lindström et al., 2014). Hence, green buildings are now being now being considered as an option for sustainability globally across various types

of organisations and nations as it improves the air quality leading to better health of the inhabitants.

The application of concepts for developing green building requires efforts and often reflects in the state of mind (Le Ber & Gregory, 2004). Characterised by efficient and less use of water, optimum energy, proper use of natural resources, low waste production and healthier places for the people either living or working in them, green building are the way for the future (Training Programmes, IGBC, 2015). As environmental issues and resource scarcity worsen, the idea of green buildings is becoming more and more popular as a way to lessen the effects of urbanisation. It is thought of as a building that is ecologically and resource-efficiently planned, constructed, refurbished, maintained, or reused (Green Building Concept, Tata Power, n.d.). Such buildings use eco-friendly processes which are environmentally responsible and resource efficient throughout a building's life cycle (USEPA, 2017). It provides various environmental benefits comprising reduced water wastage, improved air and water quality, etc. along with various economic and social benefits including better productivity and improved quality of life. Keeping in view the importance of green buildings, Goldman Sachs, the investment bank, announced its move to Battery Park City in 1995 and donated \$1 million to a community centre and \$3.5 million to the library branch (Kaminer, 2010). Microsoft is also committed to enable a sustainable future and has reduced the company's emissions by 9.5 metric tons of carbon dioxide equivalent and it recycles nearly 10 million kilograms of consumer e-waste every year (Corporate Environmental Sustainability, Microsoft, n.d.)

Leadership in Energy and Environmental Design (LEED) is working at global, regional and local levels with top building professionals around the world to design buildings which use less water and energy. During 2015-2018, LEED-certified buildings were estimated to generate as much as \$1.2 billion in energy savings, \$149.5 million in water savings, \$715.3 million in maintenance savings, and \$54.2 million in waste savings (USGBC, 2020; Clay et al., 2023). It is working on more than 79,000 projects from 160 countries (LEED, n.d.). The six credit categories, "sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovative design", which form the basis of its scoring system for new construction. LEED v5 certification is issued to buildings with the latest advancements and sustainable technologies (Zarghami & Ahmad, 2025). Apart from LEED, various other organisations at the national level are also taking the lead in this direction.

Green Building Movement in India

India has been catching up with the western countries towards achieving goals of sustainable development and green buildings. With a focus towards making it possible for India to make proper utilisation of its natural resources

and building sustainable environments, the Indian Green Building Council (IGBC) was formed in 2001 (WGBC, 2017). It develops new green building rating programmes, certification services and training programmes. A national rating system-GRIHA has been developed by TERI (The Energy and Resources Institute, New Delhi) with support from MNRE (Ministry of New and Renewable Energy, Government of India) for this purpose. The Bureau of Energy Efficiency (BEE) introduced the Energy Conservation Building Code (ECBC) in 2007 with an objective to establish baseline criteria for building construction that achieve energy efficiency by adhering to specific design guidelines (Sendrayaperumal et al., 2021).

CII-Sohrabji Godrej Green Business Centre building in Hyderabad is the first green building set up in 2004 and was awarded the Platinum rating by LEED. Since then, sustainable architecture has witnessed significant growth across the country. Other green buildings in India include Infosys Ltd. (Mysore), Indira Gandhi International Airport (Hyderabad), Infinity Benchmark (Kolkata), and I-Gate Knowledge Centre (Noida), which exemplify environmentally responsible design. Today, all types of buildings are going the green way- be it the government building, IT Park, office, residence, bank, airport, institution, hospitals, hotels, factories, schools, libraries, illustrating a national transition towards sustainable and energy-efficient construction practices. Thus, with constant efforts at different levels of policy developments, India has developed strategies for developing green buildings and their maintenance

Green libraries

Since libraries are a great place to educate citizens about the eco-friendly environment, librarians can act as leaders and guides of environmental sustainability for the nation. Libraries can take a proactive role in confronting environmental issues, particularly in climate change (Hawco, 2019; Todaro et al., 2021). Mathiasson and Jochumsen (2022) advocate for libraries and librarians to increase their involvement in promoting sustainability and sustainable development. Libraries should adhere to green policies and engage in environmentally friendly, sustainable practices, and bring general awareness among library professionals in order to achieve the desired goals, thereby acting as catalysts for significant environmental change (Ajani et al., 2024; Bincy & Vasudevan, 2023). A green library is an important part of any such institution that aims to minimise the impact of climate change by conserving natural resources and regulating all waste materials. One of the major goals of libraries is to promote social equity and fairness, which is achieved by placing branches and mobile libraries in key locations; providing technology and programmes to everyone. Regarding the environment, libraries function as local models and testing grounds for green initiatives in addition to providing information (Landgref, 2010).

With careful site selection, the use of natural building materials and biodegradable products, resource conservation (water, energy, paper), and responsible waste disposal (recycling, etc.), green libraries aim to minimise their negative effects on the environment and maximise the quality of the indoor environment (Online Dictionary for Library and Information Science (ODLIS), n.d.). Often referred to as a sustainable library, it is one that was constructed with environmental considerations in mind and uses its holdings, ecologically friendly and sustainable infrastructure, and public library services to educate the public about environmental issues (New World Encyclopaedia, n.d.). Chowdhury (2012) defined a new concept of green information system in the context of modern libraries as those systems which have been made to reduce greenhouse gas emissions at every stage of its lifecycle, in various work sections and processes, from the production of content to dissemination, access, use, and disposal. Fedorowicz-Kruszewska (2021) emphasised that all sustainable libraries can be green, but not all green libraries can be sustainable, which includes all economic, social, and environmental aspects. Such green library buildings reduce the use of water and energy by using natural and renewable resources. This not only reduces the financial aspects of building but also reduces the carbon footprint from the environment leading to better health of the living beings. Libraries form an integral component of the broader environmental movement and are frequently referred to as 'environmentally friendly libraries'. Within the academic library setting, green libraries are becoming prevalent as an advanced sustainable practice. The emergence of Green Libraries fosters sustainable practices within academic libraries and has the capacity to exemplify sustainable practices for the academic community (Adeyemi et al., 2024). These libraries incorporate environmentally conscious design, energy-conserving systems, and sustainable resource management practices within their operational frameworks. Through participation in collaborative endeavours like the Climate Action Libraries Network (CALN) and the Global Library Consortium for Climate Action (GLCCA), libraries can enhance their impact and facilitate substantial change worldwide. The interconnectedness of environmental issues requires cooperation among nations, as well as collaboration with non-governmental organisations, businesses, and civil society (Ajani et al., 2024).

A lot of emphasis is being given to make the libraries green and sustainable for the welfare of Planet Earth by various national and international library associations. In order to promote Green libraries, IFLA has formed a Special Interest Group to promote and develop sustainable library resources and services. IFLA's Environment, Sustainability and Libraries Section (ENSULIB) has offered the Green Library Award annually since 2016 to libraries, strongly associated with the Sustainable Development Goals (SDGs) of the UNO. In the year 2021–2022, the award has been divided into three categories: *Green*

Award, Green Project, and Special Recognition (Zakaria & Hendi, 2025). In 2017, IFLA also started an initiative, Library Map of the World, which gathers and shares performance data from libraries worldwide that are playing a crucial role in supporting the SDGs. Recently in 2025, an award was presented at the IFLA World Congress in Astana, James Baldwin Library, Paris, France was honoured with first place for the best Green Library Award, the Thammasat University Library, Bangkok, Thailand was awarded first place for its Green Library Project, and Special Recognition Award was given to the City Library *Ivan Goran Kovačić*, Karlovac, Croatia. The awards have inspired libraries to involve themselves in environmentally sustainable activities, thereby contributing to the achievement of the SDGs (IFLA, 2025). Sarah Ann Long (ALA President, 1999-2000) initiated a project along with Global Learning of New Jersey entitled “Libraries Build Sustainable Communities.” The project defined three components of sustainability, namely, Economy, Ecology, and Equity (ALA, n.d.). ALA has formed a Sustainability Round Table called “SustainRT” whose mission is to provide a forum for exchange of ideas and opportunities amongst the ALA members for a healthy, and economically viable society as well as provide resources for the library community for sustainability through curriculum development; collections; exhibits; events; advocacy; communication; library buildings and space design (ALA, n.d.). Moreover, back then in 2019, ALA incorporated sustainability as a fundamental principle of librarianship. In 2008, Special Libraries Association stated that it would start the process of becoming an environmentally conscious organisation for the members, board, volunteer leadership, and their staff (SLA, 2008). It also created the “SLA: Knowledge to Go Green” initiative in 2008.

The scholarly publishing sector, in an effort to promote green libraries, has not been left far behind. The Wilson Library Bulletin first featured a special section on “*Libraries and the Environment*” in February 1991 to reignite the interest in a green environmental movement, advocating thinking globally and acting locally (Antonelli, 2008; Cantú & Anderson, 2003). The University of California, Los Angeles Library (UCLA) started a peer-reviewed journal, *Electronic Green Journal* in January 1994, which contains articles on various aspects of green libraries. In 2003, a paper was published by Brown titled “*The New Green Standard*” in Library Journal, discussing the emerging trend of green libraries and proclaiming that libraries were on the cutting edge of green design (Brown, 2003). Le Ber and Gregor (2004), in their paper titled “*Becoming Green and Sustainable*”, mentioned the factors: weeded materials, office paper/junk mail, outdated computers, obsolete media, and building utilities, requiring attention for the greening of academic libraries. Moreover, a number of blogs, such as the Green Libraries Blog of ALA, provide information on significant activities, events, literature, and projects underway. Green Libraries LibGuide from the University of Illinois Library

enlists resources to help libraries go green. GreenLibraries.org provides information about Green and Sustainable Libraries (Green Libraries Website, n.d.).

A number of libraries have embraced the green movement internationally as well as nationally. At the international level, Cambridge Public Library (USA), Scottsdale's Arabian Library (Arizona), Villanueva Public Library (Columbia), Vennesla Library (Norway), Central Public Library (Singapore), Delft University of Technology Library (Netherlands), King Fahad National Library (Saudi Arabia) are some of the libraries which have been the global leaders and early adopter of the green libraries movement. Libraries which have taken the initiative in India include Karnataka University Library, Madras University Library, Mumbai University Library, Calcutta University Library, Anna Centenary Library and so on. The present study attempts to analyse the steps taken and present status of green initiatives taken by Panjab University, Chandigarh for its Central (A.C. Joshi Library) and departmental libraries.

Green initiatives at the Panjab University Library

Panjab University (PU) was set up at Lahore in 1882 and has the credit of being one of the oldest universities in India, having a long tradition of pursuing excellence in teaching and research in science and technology, humanities, social sciences, performing arts and sports. It shifted to Chandigarh during 1958-1960, following the partition of India. The university adheres to the green movement concept as it has a lot of green cover which makes the environment rich in oxygen. The university has setup facilities for rain water harvesting, solar water heaters and use of e-rickshaws on the campus. The A. C. Joshi Library which has a rich collection of resources comprising books, journals, manuscripts, rare books, theses, reports, etc., has been recognised as a heritage building.

(a) Support of the infrastructure of the library for taking green initiatives

The foundation stone of the A.C. Joshi Library building was laid in 1958 by Dr. S. Radhakrishnan, the then Vice-President of India (A. C. Joshi Library Website, n.d.). The Library building which is a tall structure having five levels is situated at the centre of the university campus and was designed by Pierre Jeanneret. The building has been built on modern principles of architecture in red stone and concrete. The staff's workspace is on the south side, while the reading rooms face north. Between the two, is the stack area. In addition to having a networking infrastructure, it has central air conditioning. The building is a heritage one surrounded by trees and plants making it an eco-friendly building which is healthier for the users and the staff. The university including the library is a no-smoking zone. The poly bags have been banned by the administration of Chandigarh which is also applicable to Panjab University. The paper napkins are also banned in the university, making the area including the surroundings of the library much cleaner and tidier. The

initiatives taken by the university authorities to promote the use of e-rickshaws (three wheelers) also benefits the library to have less pollution near the library premises.

The design of the library building is a perfect model for utilisation of sunlight as one side of the library is of glass walls/windows enabling the sunlight to reach the reading halls. The height of the ceiling of the reading halls is such that it maintains an optimum temperature during summers as well as winters and provides the perfect atmosphere for the users for studying. The furniture in the library is made up of teak wood instead of plastic and iron, thus limiting the green gases emissions and also being recyclable. The catalogue cabinets are also made up of teak wood, further helping the library with green initiatives. The computer systems in the library are shut down manually after the working hours of the Library. Lighting in the library is not required during the day time. However, after daytime the library uses tube lights and not LED lights which are not very supportive measures towards green initiatives.

(b) Implementation of green initiatives in acquisition section.

Panjab University has a rich collection of around 7 lakh publications including textbooks, bound volumes of journals and periodicals, theses/dissertations submitted by the students, some rare books, reports, information sources published by government (central, state, and U.T), back collection of newspapers, and a collection of around 1490 rare manuscripts. Its holdings of back volumes of periodicals go back to nineteenth century. Recently, the library has become a part of One Nation One Subscription (ONOS). The routine acquisition process of the library employs both electronic as well as print means for acquiring books as well as journals. The reports of the section which are generated through ILS are however printed. Also, the library does not use the budget module of SLIM 21 and relies on manual paper work so as to coordinate with the university authorities. However, on drawback is that the section contacts the department heads through print means for obtaining recommendations instead of electronic media as the administration of the university is largely based on print communications.

(c) Implementation of green initiatives in circulation section

The circulation section of the library caters to the need of over 10,000 users including the students, researchers, faculty members and members of non-teaching staff. The membership form of the library is available online. However, the authentication by the chairperson is required which necessitates for submission of the same in the printed format. Although, the circulation of the documents has not been completely stopped manually, yet the users are generally encouraged to use self-check in and check-out using the RFID system. The users are sent an SMS on their registered mobile number for confirming the issuance of the book. An SMS is also sent to remind them of the due date and on returning the book through self-checkout

(Book-Drop box). This process saves a lot of paper, as book pockets and book cards are not prepared and attached to the books in the library. However, the books which are to be transferred to the departmental libraries need to be attached with a book pocket and book cards.

(d) Implementation of green initiatives in reference section

The reference section of the library makes use of e-mail service for providing inter-library loan, ILL request through mail, and events through Facebook. However, no chat reference service is provided by the library. In the digital library section, no printing facility is provided so as to reduce paper usage and encourage users to read/save in digital formats.

(e) Implementation of green initiatives in maintenance section

Swachh Bharat Abhiyan (Clean India Initiative) initiated by the Government of India also encourages all educational institutions to maintain cleanliness and hygiene and adopt green measures. For this committees have been formed in each department in the Panjab University. Hence, the library also being a part of this initiative, is adopting green measures. All the policies framed have to be adopted by the maintenance section, accordingly.

Conclusion and Suggestions

Panjab University is trying to vouch for the status of Institute of Eminence (IoE) under three major areas namely, (i) Energy (ii) Medicine (iii) Environment. For this purpose, the present study endeavoured to analyse the Green initiatives currently adopted by A.C. Joshi Library at Panjab University, Chandigarh, India. The analysis indicates that although some of the efforts have been taken in this direction, still more can be achieved by adopting additional measures. The design of the building helps to make use of natural sunlight, during the evening hours LED lighting should be used to save energy and reduce emission of gases. To save energy, sensors should be used for auto shut down of devices and lightings. It would be better if the solar system panel installed at the roof top also provides power, which is lying unused. It will result in huge energy savings. The same roof top space can also be utilised for growing flowers and increase the oxygen level around the campus. In order to reduce air pollution, the surrounding area of the library should be made no vehicle zone. The library is not currently using the budget module of the SLIM21 software and relying completely on print communication. If the budget module is used, a lot of paper-work shall become paperless and help in reducing carbon footprint. Moreover, for communication with vendors and publishers, e-mail should be used to reduce wastage of paper. Instead of generating paper receipts for self-check-in and checkout, SMS should be sent to the registered mobile numbers of the users. Photocopying service should be minimised to reduce paper wastage and also reduce greenhouse gases emission from the photocopying machine. The reference section needs to provide the orientation program

online through the library website, using the available infrastructure. The reference librarian should provide the users information literacy programs promoting green initiatives in use of resources. The Librarian should make sure that the chemicals and cleansers used in the library are not toxic to the environment.

By implementing the aforementioned suggestions, the library can contribute towards the sustainable development of 'The City Beautiful' and hinder impact of climate change in the surrounding area. Moreover, if all the libraries in India and also the developing countries contribute a little to combat the hazards of climate change by adopting such small measures, it can certainly help save our Planet Earth.

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Libraries in the Digital Age: Anytime, Anywhere, Any Resource

Afsana Rashid

Abstract

Libraries have always been a backbone of a knowledgeable society. They have served as centres of learning and culture. Infact many libraries are custodians of rare manuscripts, historical documents and other significant records. Given their significance, libraries have tremendous potential to reach out to a wider audience both in physical as well in online mode. In the digital age, the scope widens. From being just physical repositories of resources, they have evolved into dynamic digital hubs of datasets, e-resources, achieves and many other services.

High speed internet connectivity, digitization and AI have transformed the scope and significance of libraries. This has not only been in terms of their availability and accessibility, but it has improved their efficiency and made the services personalized. Libraries can be accessed from anywhere and at any time. Apart from e-books and online catalogs, they provide remote access to journals. Rare and fragile manuscripts and historical documents have been digitized ensuring their preservation and global access.

Bridging digital divide, facilitating resource sharing and collaborations, ensuring real-time services, automating routine tasks, apart from offering spaces for debates and discussions, campaigns and deliberations, libraries today have repositioned themselves and expanded as centres of innovative and creative community hubs. Apart from invaluable benefits, libraries grapple with significant challenges such as budget constraints, professional training demands, digital infrastructure development and data security.

Keywords: *Physical repositories, rare and fragile manuscripts, AI, virtual reality, community hubs, creativity, data security, digital resource hub and lifelong learning.*

Introduction

Once defined by shelves and silence, libraries in the digital age have repositioned themselves and expanded as centres of innovation, creativity and vibrant community hubs. Libraries have always been a backbone of a knowledgeable society. They have served as centres of learning and culture. Infact many libraries are custodians of rare manuscripts, historical documents and other significant records. Given their significance, libraries have tremendous potential to reach out to a wider audience both in physical as well in online mode. In the digital age, however, the scope widens. From being just physical repositories of resources, they have evolved into dynamic hubs of online datasets, digital archives, e-resources and many other services.

Hassans (2025) observed that libraries have for centuries served as pillars of knowledge and resource hubs for communities in approachable, physical spaces. In the current digital scenario, they are continually adapting to ensure their relevance and viability. Integrating AI, chatbots and techniques

of virtual reality into library services is a rapidly growing next step as technology evolves.

Infact, hi-speed internet connectivity, digitization and AI have transformed the scope and significance of libraries. This has not only been in terms of their availability and accessibility, but it has improved their efficiency and made the services personalized. Libraries can be accessed from anywhere and at any time. Apart from e-books and online catalogs, they now provide remote access to journals. Rare and fragile manuscripts, historical documents, archives have been digitized ensuring their preservation and global access. This has also promoted inclusivity of multilingual, multicultural and multiregional documents.

Digital libraries have come a long way since their inception in the 1990s. The first digital libraries were created to provide access to scientific papers and journals. One of the earliest digital libraries was the NASA Technical Reports Server (NTRS) launched in 1994 to provide access to NASA's technical reports and other scientific materials. Another early example was the Online Computer Library Center (OCLC) established in 1967 and began digitizing library catalogs in the 1980s. The advent of the World Wide Web in the early 1990s marked a turning point in the evolution of digital libraries. As the web provided a platform for creation and dissemination of digital content, libraries began to provide access to their collections. The Alexandria Digital Library was the first web-based digital library launched in 1996 by the University of California that provided access to geospatial data and maps and served as a model for other digital libraries (Gayan, 2023).

India's library system that has a rich and varied history mirrors the country's dynamic cultural, intellectual and technological evolution. From ancient manuscript collections in temples and royal courts to modern-day digital libraries, the journey of libraries in India reflects the complex history of the country. Libraries in India have served as cultural, intellectual, and educational centers, adapting to changing times and technologies (Girde & Kore, 2025). Infact, the National Mission on Libraries of the Ministry of Culture has established the National Virtual Library of India that features the Indian Culture Portal. The portal integrates digitized objects (rare books, archives, paintings, photographs, etc.) of participating organizations. The Digital Library Initiative of the Raja Rammohun Roy Library Foundation digitizes rare public-domain books and newspapers in libraries across the country, with a purpose to create National Digital Repository (Sharma, 2025). Libraries, in the digital age, have embraced new roles as community hubs. They provide free internet access, trainings and space for collaborative learning and continue to serve as gateway to knowledge, research, innovation and cultural enrichment (Moradia et al., 2024). Libraries are evolving into dynamic, multifaceted hubs that serve both educational as well

as social purposes. They even offer spaces for dialogue, creativity, collaborations and other civic engagements.

Review of Literature

Recent research work explores the changing dynamics of libraries in view of technological advancements taking place at rapid pace and the related societal shifts. Mostly research work emphasize on technological integration and the socio-cultural dimension of libraries in the digital age.

Bhagvanji and Patel (2023) emphasize that libraries are no longer confined to physical spaces; they serve as *information gateways* and *collaborative platforms* for community engagement. Shingade and Patil (2024) argued that libraries have long been guardians of knowledge, serving as repositories of human history, culture and information. In the digital age, the role of libraries has significantly evolved as the world becomes increasingly connected and information easily accessible. While the digital revolution has brought about transformative opportunities, it has also presented libraries with a unique set of challenges. The digital revolution has disrupted traditional library practices, it has also empowered libraries to reach new heights in preserving knowledge, promoting education and fostering vibrant communities.

Hassans (2025) observed that libraries are undergoing a significant transformation as they adapt to the demands of the digital age. While they continue to fulfill their traditional mission of providing knowledge and resources, their roles are expanding to include technological innovations and trainings and foster community-building linkages. Besides, challenges such as budget constraints, digital access disparities and evolving user expectations require libraries to continuously reinvent themselves.

Libraries are adapting to remain relevant by embracing digital formats and reshaping their services to meet the needs of users. Meesad and Mingkhwan (2024) elucidate that libraries have become *community hubs* offering inclusive spaces for *dialogue, civic engagement and creativity*. Libraries now play an integral role in preserving cultural heritage, fostering innovation, promoting creativity and building community resilience.

The reviewed literature also highlighted the challenges associated with the digital transformation of libraries such as funding, staff professional development and other digital infrastructure related issues. Sharma (2025) emphasize that continued modernization requires adequate funding, regular training, comprehensive policy framework and vibrant community engagement.

In this context, the article tries to explore the role and significance of libraries in the digital age to support lifelong learning, community engagements, innovations and inclusivity.

Objectives

- a) To examine how easy access to libraries has transformed their role in the digital space
- b) To explore libraries as vibrant community spaces where knowledge and technology synchronize to create an inclusive and collaborative learning ecosystem.

Methodology

Given the qualitative orientation of the topic, a detailed and descriptive approach was adopted. The research design was interpretive in nature, allowing for indepth exploration of the subject under consideration. Following an extensive literature review, certain key themes and sub-themes were identified and then analyzed and discussed in detail. Each theme was critically examined in relation to the research objectives and meaningful insights were derived and conclusions drawn.

Discussion and Analysis

Libraries have served as integral institutions since ages while acting as gateway to repositories of information and leading to knowledge sharing and capacity building. In the current digital landscape, the responsibility has widened. By embracing technological advancements, libraries have repositioned themselves as user-centric institutions by offering uninterrupted access to digital resources, personalized services, community engagements and other interactive learning experiences.

Libraries have significantly evolved from traditional repositories to digital hubs from physical card catalogs to online databases and digital catalogs, from printed material to e-resources, open access and online journals. This has allowed users to access a vast array of resources, including books, articles and multimedia content, from anywhere anytime, thus, supporting lifelong learning. Collaborative spaces are being encouraged and libraries host events, workshops and other programs to strengthen dialogue and civic engagements.

From Traditional Repositories to Digital Resource Hubs

In the pre-digital era, libraries primarily focused on physical collections and in-person services, acting as gateway to learning and research. With the advent of digital revolution and rapid advancements in technology, libraries have undergone a profound transformation, integrating seamlessly into the technological fabric of modern society. The shift from traditional to digital services has been driven by emerging technologies. While VR allows users to immerse themselves in virtual environments such as exploring historical sites, creating art or reenacting historical events. For example, the New York Public Library implemented a VR programme that enables users to virtually visit the 1939 World's Fair with the aim to provide an interactive and

immersive experience that brings history to life. Similarly, the University of Illinois library has used VR to offer virtual tours of its special collections, allowing remote users to explore rare and fragile materials without physical access. The British Library has used AR to create interactive exhibits that allow visitors to explore manuscripts and other rare items more dynamically. Users can point their devices at specific objects to access additional information, multimedia content, or 3D reconstructions, making the learning experience more engaging (Rahmanova, 2025).

Ashikuzzaman (2025) argued that digital transformation has helped to preserve and provide access to rare and fragile resources. The manuscripts, historical documents and archives are often delicate and prone to deterioration. Through digitization, libraries can create high-quality digital copies of these materials and ensure their preservation while maintaining accessibility. Digital preservation not only extends the life of these materials but also allows researchers to access them remotely, breaking down geographical and physical barriers that might have once limited access. Thus, libraries have embraced the digital age to ensure information remains preserved, accessible and relevant in the growing digital world.

Centres for Lifelong Learning, Creativity and Innovation

Libraries have evolved beyond their traditional functions of storing and lending books. They now serve as vibrant and inclusive spaces where community shares, connects, learns and innovates. They have emerged as dynamic community centres where space for debates and discussions is facilitated, educational workshops and cultural programmes are conducted and community well-being, social cohesion and cultural expression ensured. As libraries adapt and innovate, they continue to serve as essential pillars of information access, cultural preservation, and community enrichment in a world where information knows no bounds and technology is an ever-present companion (Shingade & Patil, 2024).

Many libraries host workshops and other programmes to foster continuous education and promote lifelong learning. Hands-on creative workshops and other networking opportunities are also held. For example, the Brooklyn Public Library regularly hosts art exhibitions that not only highlight the work of local artists but also offers poetry reading and performances. Similarly, the Vancouver Public Library's Residency Programme offers artists the chance to create new works while interacting with the public and offering performances and conducting workshops (Ashikuzzaman, 2025). Kerala has one of the most extensive public library network in India that offer literacy programmes, community education and lifelong learning. In Kerala, the concept of a library transcends mere reading; it evolves into a dynamic nucleus where the rich fabric of cultural diversity is intricately interwoven (Outlook India, 2024).

Digital libraries have become an indispensable resource while providing access to a vast collection of information from anywhere in the world at any time. The future of libraries in the digital age is expected to be shaped by various emerging trends and technologies. AI can automate routine tasks, enhance user experience and provide instant assistance through chatbots. Virtual and augmented reality applications can create immersive learning experiences, facilitate virtual meetings and collaborations and assist users in navigating physical library spaces (Belsare, 2024).

Challenges Ahead

The digital age has reshaped the way we access, consume and interact with information. Libraries have adapted accordingly. While challenges such as digital divide, privacy concerns, and copyright issues emerge, libraries have demonstrated resilience and innovation. They have harnessed the power of digital resources, open access initiatives, and collaborative tools to serve as invaluable sources of knowledge, education, and cultural preservation (Shingade & Patil, 2024).

As the digital collection grows, libraries are faced with the need to balance limited physical space with expanding digital resources. This can lead to logistical difficulties in resource allocation, where libraries must decide how much physical space to dedicate to traditional collections versus digital access points such as digital kiosks and multimedia centers. Additionally, maintaining the physical infrastructure such as servers for digital collections or space for digitization labs, adds another layer of complexity to the management process. The preservation of both physical and digital materials poses a significant challenge. Physical collections are subject to wear and tear over time, while digital content faces risks such as data corruption, file format obsolescence and technological failures. Libraries must implement preservation strategies for both formats, which can involve investing in high-quality storage systems for physical items and robust backup solutions and digital preservation methods for electronic content (Ashikuzzaman, 2025).

Amidst all this, data security remains a critical concern, with libraries facing the risk of breaches that could compromise sensitive user information. Ensuring robust security measures is essential to protect both the privacy of users and the integrity of library collections. Transition to digital catalogues requires staff training to keep pace with evolving technologies. This requires a significant investment in time and resources. Accessibility is yet another challenge. Libraries must ensure that digital catalogues are usable by all including those with disabilities, requiring careful design and regular updates to meet diverse needs (Rahmanova, 2025).

These set of challenges bring significant changes in the role and responsibilities of library staff. They have to switch over from their routine traditional tasks to technical responsibilities such as digital content

management, maintenance of digital archives and so on. Consequently, libraries have to align with emerging technological advancements and user-centric services to stay relevant, engaged and inclusive.

Conclusion

Libraries continue to evolve while embracing technological advancements taking place at a rapid pace. While expanding their reach in the digital realm, they have to ensure effective digital content management for discoverability and interoperability; adhere to data protection regulations while handling digital content and user data and promote inclusivity.

With Gen AI around, libraries have a potential to evolve as smart knowledge ecosystem while negotiating with key concerns of equity, ethics, expectations and engagements.

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Mapping Scholarly Communication on the Role of Libraries in Crisis Management and Disaster Response: A Bibliometrics Analysis

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Abstract

Disaster is a phenomenon or an unexpected happening, which can be both natural and man-made, that particularly disturbs & to some extent causes harm to humans, organizational infrastructure, and national heritage. In this context, the public library plays a crucial role in the conservation and preservation of cultural heritage, rare and other valuable resources, to not only protect it for the present generation but also to portray the rich culture of the nation to the upcoming generation. It becomes an utmost need of the hour, libraries emerge to safeguard their resources, capturing and digitizing cultural manuscripts of national importance, catering their services to potential communities, facilitating communication, and providing hassle-free reading rooms to their users. Important guidelines given by ALA and IFLA focus on retro-conversion of library resources, an effective framework for disaster management plans, and various information services for users in times of emergency. Several libraries around the world started taking initiatives for disaster management and recovery preparedness in times of need. The National Library of Australia has been working on digital preservation for protecting cultural heritage manuscripts, while Kerala state central library, after the severe destruction caused by the Kerala flood 2018, started taking efforts for the restoration of documents to promote the dissemination of knowledge to their communities using those resources. This study presents a comprehensive bibliometric analysis of global scholarly output on the role of libraries in crisis management and disaster response. Data is extracted from the rich Scopus database by using an advanced search strategy. The extracted data were analysed, synthesized, and represented in the form of tables, figures, and charts with the help of bibliometrics performance indicators and science mapping tools like VOSviewer, Biblishiny, and the Microsoft Office package. The findings of the study will examine publication trends, prominent authors, institutions, countries, core sources, thematic evolution, and collaboration networks.

Keywords: Disaster management, Crisis response, Library resilience, Emergency information services, Bibliometrics, Scientometrics

Introduction

Crisis is defined as 'any incident which threatens human safety and/or damages, or threatens to damage, a library's buildings, collections (or item(s) therein), equipment and systems' (Akhshik & Beglou, 2023; Eden & Matthews, 1996). In the time of disaster, whether it is natural or man-made, a library, being a non-profit organization, holding a vast & rare collection, should have a proper disaster preparedness plan or strategy to survive such damage. Disaster can be of any type, ranging from natural to social,

technological, and financial. Research around the world on disaster management & preparedness, which holds an important value to learn from various experiences, and to advance their strategies to design a proper roadmap to protect its core & precious collection from being mutilated. Libraries should work closely with local organizations to prepare a plan regarding disaster response in the time of crisis to serve and protect their fundamental collection for future generations to come. In addition to it, at ground level, it helps society to learn about how to deal with these indifferent situations. Various studies around the globe examined that library professionals' attitudes, unskilled and limited library staff, absolute technology, insufficient space and working area, lack of funding, etc., lead to the absence of a disaster management plan in such a valuable organization. Major research around the world explored that various perception related to disaster preparedness plans by libraries differs across several community members, as they don't recognize libraries as a valuable organization holding such a precious manuscript, and conserving & preserving resources for national importance (Young, 2018). It is a need of the hour to recognize libraries for the value they hold, the services they provide, and to cater to the needs of their users. So, this self-serving organization must have a future-oriented disaster recovery plan to safeguard its resources from any kind of disaster and serve & guide its community members in times of need.

Literature Review

Khademizadeh et al. (2023) explored that the dust crisis is one of the major problems faced by some parts of Iran due to climate change. The study is based on a qualitative research design conducted using semi-structured interviews with a total of 11 employees and managers of public libraries of Ilan, Khuzestan, Kermanshah, and Kurdistan. Further, the study identified the three-stage disaster recovery measures starting with the pre-crisis stage, where library work is informative, educational, cultural, and executive level; during the crisis level, they adopt executive and informative roles, while documentation and executive roles are adopted during the post-crisis stage. The study conducted by Ismail (2023) is based on qualitative case studies and thematic analysis, exploring how academic libraries during the COVID-19 pandemic in Malaysia look after the damage caused. The research examined how libraries have evolved their roles by enhancing their services to satisfy the needs of users during times of disruption. The findings also suggest that major libraries do not have a proper proposed formal plan for Disaster Management, but they have several strategies to deal with it. Several experiences from learned libraries could help various other developing libraries and policymakers to construct their own disaster management plan to survive such unseen disasters.

Ntullo (2026) identifies four important steps, such as preparedness, mitigation, response, and recovery, to prepare themselves for any unwanted disaster, whether natural or man-made. The study found that identification of various possible key factors & risk levels and managing them is the initial step. Taking into account the ever-going Plan-Do-Check-Act (PDCA) cycle will minimize the risk of disaster. Several aspects, like severity and frequency of disaster, library collection, users & staff, location of library building, etc., should be considered for risk analysis.

Another study conducted by Ashiq et al. (2022) investigated how academic libraries functioned during the COVID-19 pandemic from 2020 to 2021. The study was based on a systematic review, using PRISMA Guidelines, through which 23 studies were taken from Scopus, Web of Science, LISA, and LISTA databases. The study found that the role of libraries, their management, and services have transformed a lot during the time of the pandemic. Many difficulties were faced by libraries during COVID-19, but the adoption of modern digital services and various web communication tools overshadowed those challenges. The findings revealed that libraries around the globe should adopt several initiatives like remote access, advanced digital infrastructure, communication through social media, and enhance their library webpages to deliver more apt & current information related to their users' needs. A proper Disaster Management Plan (DMP) should be developed at the institutional level to overcome various severe future crises. The innovative research study by Yucesoy et al. (2025) explored the use of drones in the time of disaster response. The study examined the three main uses of drones, which are the collection of information, facilitating deliveries, and maintaining a communication channel in times of crisis. Various operational dysfunctions and gaps were also identified during the research. Such advanced technologies could also be implemented in the libraries to disseminate essential information to their users in a period of disaster.

Dada et al. (2025) investigated the importance, challenges, and various measures to safeguard library collection & rich national heritage. The study emphasized the support libraries could take from the British Library and the Nigerian Environmental Management Agency in times of emergency, preparing professionals for the time of crisis through training and dissemination of information. Overall, the research paper placed importance on policy-making, library collaboration, effective training, and advancement in technological use, which could eliminate the risk of disaster in libraries.

Duh et al. (2022) explored the disaster response plan of academic and special libraries based in Croatia. Several libraries were under or a part of a bigger institution, which restricts their power of decision-making in the time of disaster. These libraries comprise the vast and rare material to be secured during the period of crisis. The study makes use of the survey method to collect data from several libraries, particularly focusing on the training of

staff, preparedness plans formulated by libraries, assessing risk during the time of disaster, etc. The finding explored that incompetence in equipment used, resources managed, and disaster response potential among libraries were the main reasons for failure.

Objectives of the Study

The present study was conducted to fulfil the following formulated objectives:

- a) To identify the annual scientific production on the role of public libraries in crisis & disaster management.
- b) To know the author's productivity and collaboration patterns of the research area.
- c) To find out the prominent institutions, source titles, and leading publishers of the domain.
- d) To portray funding agencies that contribute most significantly to the research domain.

Research Methodology

The present study sought to portray the research outputs of Indian Authors on the Role of Libraries in Crisis Management and disaster response. A quantitative bibliometric research design was formulated, and the relevant data for the study were extracted from the on 11th March 2026, via. Scopus database by using advanced search strategies, after cleaning and eliminating the irrelevant entries. A total of 918 data points were downloaded in CSV format to run the file in RStudio packages and VOSviewer. The process of analyzing the bibliographic dataset and writing the research paper took place via. Microsoft Excel & Word to interpret the findings of the study in the form of tables and figures.

Data Analysis and Interpretation

General Information about the Data

The general information of the extracted dataset is represented in Table 1, which highlights that scholarly communication happens between 2016 and 2025 in India. A total of 918 documents were published in 630 different sources, indicating a decent level of engagement among scholars in this domain, and the number grew at a rate of 14.19% annually. A total of 4,265 authors has contributed their knowledge, in which a strong collaboration pattern is noted with 5.55 co-authors per published document, and authors prefer to publish their manuscripts in the form of journal articles, which cover almost 52.17% of total documents published during the time span, followed by conference papers with 24.72% and reviews with 15.03%, respectively.

Table 1: General Information About Data

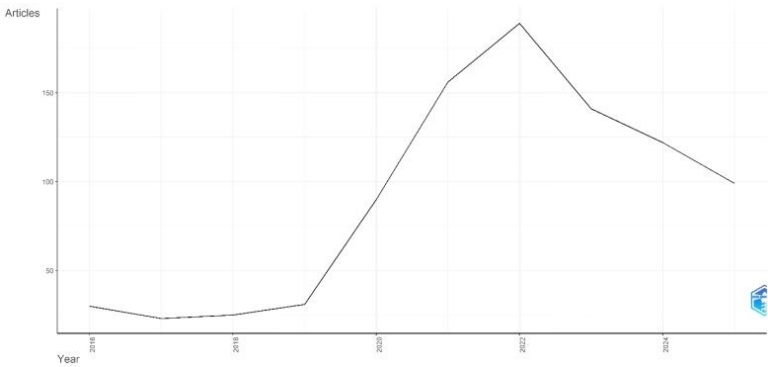
Main Information about Data	
Timespan	2016:2025
Sources (Journals, Books, etc)	630
Documents	918
Annual Growth Rate %	14.19
Document Average Age	4.16
Average citations per doc	18.05
References	101958
Document Contents	
Keywords Plus (ID)	8119
Author's Keywords (DE)	3171
Authors	
Authors	4265
Authors of single-authored docs	57
Authors Collaboration	
Single-authored docs	48
Co-Authors per Doc	5.55
International co-authorships %	25.17
Document Types	
Article	479
Book	11
Book chapter	53
Conference paper	227
Data paper	1
Letter	4
Note	3
Review	138
Short survey	2

Annual Growth Trend Line

Fig. 1 shows the annual production of publications on the role of libraries in managing disasters and crises from 2016 to 2025. The graph highlights a remarkable indication that the publication count from the year 2016 to 2019 was very low, and on average, 27.25 documents per year only. Whereas, a stage comes where a hike in publication starts from the year 2020 onwards, reaching its peak with the publication of 189 documents in 2022, which happens due to the global attention toward information services during the COVID-19 pandemic, and libraries perform a crucial role in disseminating information and supporting the information needs of the user community. After 2022, the declining line of production of publications was noted, but it

still remains higher than the initial year, highlighting the sustained scholarly importance of the domain.

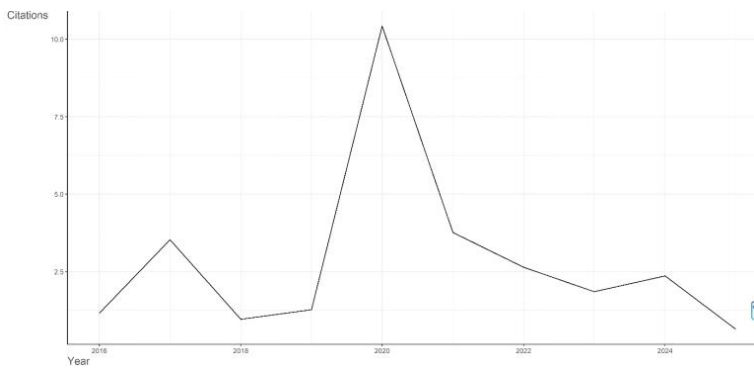
Fig. 1: Annual Growth Trend Line



Average Citation Pattern Per Year

Fig. 2 shows the position of citations per year, highlighting low citation count in the early stage of publication from 2016 to 2019, as only 109 documents were published during the span. But after 2020, a rise in the citation count was noted, and it reached its peak in 2020, indicating publications from that period were relatively more recognized globally. After 2020, the citation count increased at a diminishing rate, which may have happened due to the shorter time period available to get new citations of published literature.

Fig. 2: Average Citation Per Year

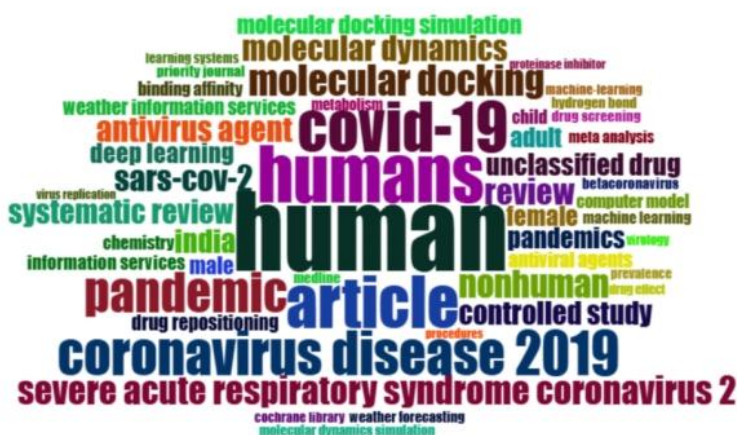


Word Cloud Related to Trendy Topics

The word cloud of trendy topics is highlighted in Fig. 3, illustrating the most frequently occurring words during the span 2016 to 2025, the dominance of

key terms such as “human”, “COVID-19”, “pandemic”, and “Coronavirus disease 2019.” Indicating a significant majority of documents were created and closely associated with the COVID-19 pandemic. The presence of other words in the cloud, such as systematic review, unclassified drug, controlled study, and health science, suggested integration of the interdisciplinary domain of knowledge. The presence of remarked keywords in the cloud shows how global crises shaped scholarly communication and generates opportunities to disseminate individual knowledge to unexplored areas of research.

Fig. 3: Word Cloud of Trendy Topics



Prominent Sources Title Related to the Study

Most prominent source titles of the Domain were highlighted in Table 2, on the role of libraries in crisis and disaster management, indicating 4.85% of documents published in *Library Philosophy and Practice*, and ranked 1 in the top ten list of prominent source titles, indicating its significant presence in disseminating research in the domain. Followed by *Journal of Biomolecular Structure and Dynamics*, secured rank 2 in the list with contributing 3.09%, and *Lecture Notes in Networks and Systems*, secured rank 3 with 2.09% documents in the research area. Whereas Table 3 also mapped a list of other sources that exist in the top 10 but published in a few publications, like *Lecture Notes in Networks and Systems* with 2.09%, *Journal of Indian Library Association* with 1.10%, and *Lecture Notes in Electrical Engineering* with 0.99%, representing research in this field is published across interdisciplinary platforms.

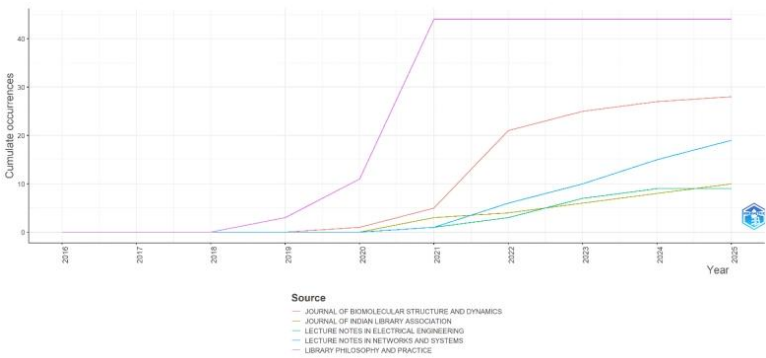
Table 2: Most Prominent Source Title of the Domain

Rank	Source Title	Total No. of Documents	% Share of Total Documents
1	Library Philosophy and Practice	44	4.85%
2	Journal of Biomolecular Structure and Dynamics	28	3.09%
3	Lecture Notes in Networks and Systems	19	2.09%
4	Journal of Indian Library Association	10	1.10%
5	Lecture Notes in Electrical Engineering	9	0.99%
6	Emerald Emerging Markets Case Studies	8	0.88%
7	Aip Conference Proceedings	7	0.77%
8	Clinical Epidemiology and Global Health	6	0.66%
9	Communications In Computer and Information Science	6	0.66%
10	Computers In Biology and Medicine	6	0.66%

Production of Source Over Time

Fig. 4 indicates the procurement by source over time, highlighting that *Library Philosophy and Practice* are dominating the field of knowledge from 2021, followed by *Journal of Biomolecular Structure and Dynamics* and *Lecture Notes in Networks and Systems*, which have started to rise during recent years. Overall, the figure shows there has been a rise in contributing multidisciplinary sources of development of the researched area.

Fig. 4: Source Production Over Time



Pattern Related to Authors Productivity and Collaboration

Table 3 illustrates the authorship pattern of the studied area, the dataset indicating that around 93% of documents are published in collaboration with more than at least one author, which shows the strong collaboration trend in the research domain. Table 3 also highlights that there is a strong dominance of publications that have more than four authors, which covers almost 41.61% (382) of the total published documents, followed by two-author papers, which is 20.58% (189) of the total share of documents. In the context of one-authored documents, it represents only 6.20% (57) of research during the time span. Overall, the figure suggests the author of the domain believes that collaboration not only enhances the quality of research but also disseminates the studied findings to the large population to address complex global challenges.

Table 3: Authors Productivity and Collaboration Patterns

No. of Authors	Paper Contributed	Cf	% Contribution
Single Author	57	57	6.20%
Double Authors	189	246	20.58%
Triple Authors	152	398	16.55%
Four Authors	138	536	15.03%
More Than 4 Authors	382	918	41.61%

Most Productive Authors Related to the Study

Table 4 highlights the most productive authors contributing to this research area. Kaur, Harpreet ranks first with 6 publications and 44 total citations. Bhatt, C.M. and Singh, Amit Kumar follow with 5 publications each, with Singh receiving a notably high 292 citations. Kumar, Amit demonstrates the highest impact with 351 total citations and an average of 87.75 citations per article. Other authors such as Ahmad, Shaban and Padmanabham, J. also show meaningful contributions. Overall, the table indicates that while several authors contribute moderately in terms of publication count, some demonstrate strong citation impact within the field.

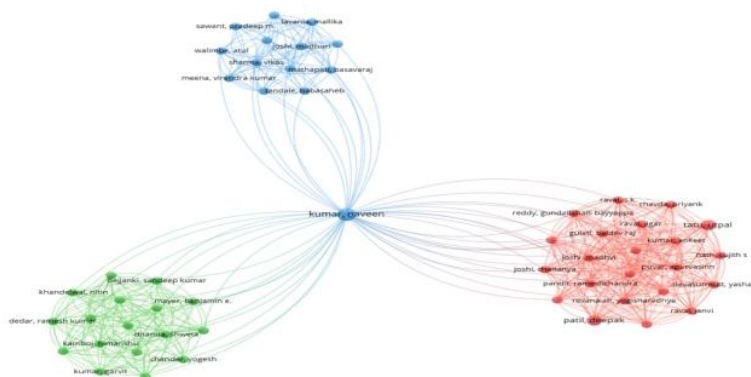
Table 4: Most Prolific Authors of Domain

Rank	Name of Author	Documents Contributed	Total Citation	Avg. Citations per Articles
1	Kaur, Harpreet	6	44	7.33
2	Bhatt, C.M.	5	102	20.4
3	Singh, Amit Kumar	5	292	58.4
4	Ahmad, Shaban	4	172	43
5	Balakrishnan Nair, T.M.	4	13	3.25
6	Kumar, Amit	4	351	87.75
7	Padmanabham, J.	4	34	8.5
8	Alshamrani, Saleh	3	125	41.66
9	Alturki, Norah A.	3	125	41.66
10	Alzamami, Ahmad	3	125	41.66

Collaboration Pattern among Authors

The authors' collaboration network in the domain of libraries and their roles in crisis and disaster management is shown in Table 5, indicating network categories in three major clusters or groups, highlighting the red cluster, which is the largest and indicates a dense collaboration among several authors, suggesting an active and closely connected research group in this domain. The blue cluster represents another group of scholars with moderate collaboration links among themselves. The green cluster is comparatively smaller but still shows cooperative research activity. A central author, Kumar, Naveen, appears as a key connecting node linking multiple clusters, indicating a bridging role in scholarly collaboration. This pattern suggests that while research is conducted in groups, a few authors play an important role in connecting different research communities.

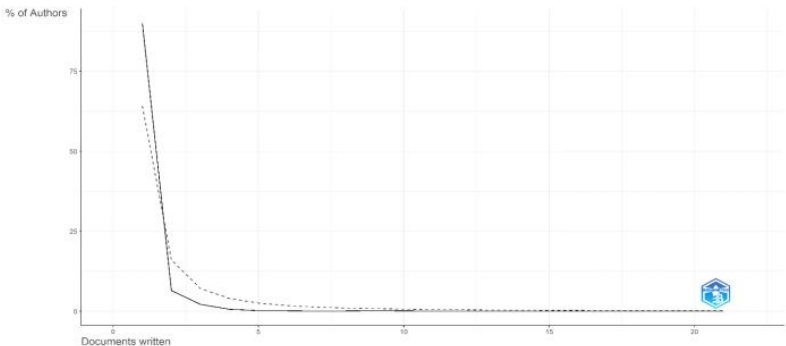
Fig. 5: Authors Collaboration Network



Implementation of Lotka's Law and Its Assessment

Fig. 6 highlights the implementation and assessment of Lotka's Law, which portrays the distribution of authors according to their research productivity. The graph indicates that the maximum number of authors have published only one document, whereas the diminishing number of authors versus the increase in the number of documents published as the number of documents written increases. This inverse relationship indicates that only a small number of publications indicate the inverse relationship of the publication in the field. The dotted and solid lines represent the observed and theoretical distributions, which appear closely aligned, suggesting that the author's productivity pattern in this research area generally follows Lotka's Law. This finding indicates that scholarly output is dominated by many occasional contributors and a few highly productive authors.

Fig. 6: Lotka’s Law Implementation and Assessment



Highly Cited Documents Globally

Table 5 represents the most globally cited documents in the study area, highlighting an article published by Rajkumar (2020) in the Asian Journal of Psychiatry, having the maximum number of citations with 2541, indicating the high recognition of the paper globally. However, Aggarwal (2021) and Davis (2017) also have significant scholarly engagement of their studies with 742 and 553 citations till now, respectively. Overall, the table highlights that a low share of influential documents has significantly shaped the research domain.

Table 5: Most Globally Cited Documents

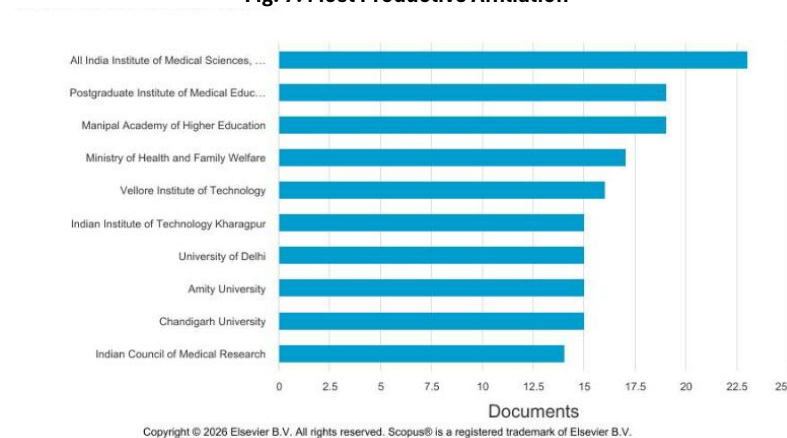
Rank	Paper	Total Citations	TC per Year	Normalized TC
1	Rajkumar RP, 2020, Asian J Psychiatry. DOI: 10.1016/j.ajp.2020.102066	2541	363.00	34.79
2	Aggarwal A, 2021, Int J Inf Manag Data Insights. DOI: 10.1016/j.jjimei.2020.100004	742	123.67	32.90
3	Davis AL, 2017, Crit Care Med. DOI: 10.1097/CCM.0000000000002425	553	55.30	15.66
4	Krishnamoorthy Y, 2020, Psychiatry Res. DOI: 10.1016/j.psychres.2020.113382	426	60.86	5.83
5	Bolan S, 2024, Sci Total Environ. DOI: 10.1016/j.scitotenv.2023.168388	400	133.33	56.48
6	Pisano M, 2020, World J Emerg Surg. DOI: 10.1186/s13017-020-00336-x	353	50.43	4.83
7	Shah B, 2020, Life Sci. DOI: 10.1016/j.lfs.2020.117652	330	47.14	4.52

Rank	Paper	Total Citations	TC per Year	Normalized TC
8	Khan RJ, 2021, J Biomol Struct Dyn. DOI: 10.1080/07391102.2020.1753577	253	42.17	11.22
9	Kumar Y, 2020, J Infect Public Health. DOI: 10.1016/j.jiph.2020.06.016	203	29.00	2.78
10	Misra S, 2021, Neurology. DOI: 10.1212/WNL.00000000000012930	203	33.83	9.00

Most Productive Affiliation

Fig. 7 illustrates the most productive institutional affiliations contributing to the research domain. The data indicate that the All-India Institute of Medical Sciences (AIIMS) holds the leading position with the highest number of publications, reflecting its strong research involvement in crisis management and disaster-related studies. Other significant contributors include the Postgraduate Institute of Medical Education and Research, Manipal Academy of Higher Education, and the Ministry of Health and Family Welfare. Institutions such as the Indian Institute of Technology Kharagpur and the University of Delhi also demonstrate notable contributions. The distribution highlights the active role of major academic and medical institutions in advancing research related to crisis management.

Fig. 7: Most Productive Affiliation



Most Contributed Publisher in the Domain

Table 6 states the publisher's contribution towards the research domain, highlighting Lippincott Williams and Wilkins securing rank 1 by publishing 15.46% (142) of the total documents published during the studied period. Followed by Elsevier B.V., Springer Science and Business Media Deutschland

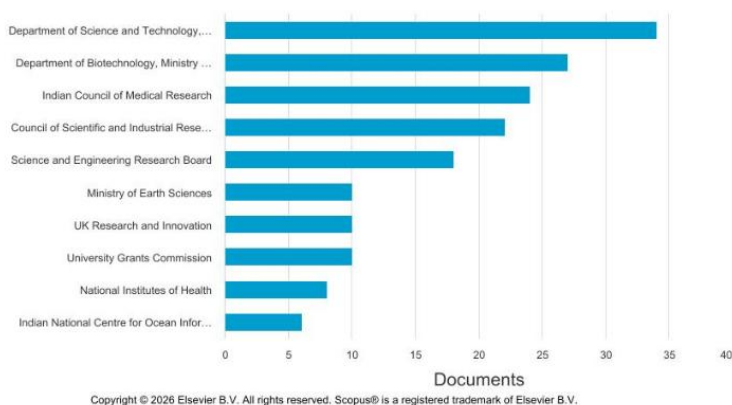
GmbH, Association for Computing Machinery, and Hindawi Limited with 7.73% (71), 5.33% (49), 4.79% (44), and 3.81% (35) documents, respectively, were securing their rank under the top 5 publishers. Apart from the top 5 publishers, some others, such as Elsevier Inc. with 3.48% (32), and SAGE Publications Ltd with 3.26% (30) also give their notable contributions in the domain. This distribution indicates that only some publishers are dominating in the field and are contributing the maximum count of documents, reflecting that authors are used to publishing their research in high-impact academic publishers.

Table 6: Most Contributed Publishers

Rank	Publishers	Documents Published	% Share of Total Documents
1	Lippincott Williams and Wilkins	142	15.46%
2	Elsevier B.V.	71	7.73%
3	Springer Science and Business Media Deutschland GmbH	49	5.33
4	Association for Computing Machinery	44	4.79%
5	Hindawi Limited	35	3.81%
6	Elsevier Inc.	32	3.48%
7	SAGE Publications Ltd	30	3.26%
8	Wolters Kluwer Medknow Publications	27	2.94%
9	Research Journal of Pharmacy and Technology	20	2.17%
10	Deniz Publication	17	1.85%

Top Funding Agencies of the Decade

Fig. 8 presents the top funding agencies supporting research publications during the decade. The Department of Science and Technology emerges as the leading funding body, followed by the Department of Biotechnology and the Indian Council of Medical Research. Other prominent agencies include the Council of Scientific and Industrial Research and the Science and Engineering Research Board. The figure also indicates that research happens in India, with the help of international funding agencies like UK Research and Innovation and the National Institutes of Health. Overall, the figure showed that government support is crucial for the promotion of research as well as research & development of the country.

Fig. 8: Top Funding Agency of the Decade

Conclusion

To provide a detailed and comprehensive overview, bibliometric analysis is the best way to compile various scholarly research publications to analyse the current scenario of disaster management plans and response rates in libraries around the world. The study suggests a significant increase in publications over the years to identify the need to focus on these non-profit organizations, as they hold resources that are rare and nationally important. The current bibliometric analysis recognized several factors, such as the type of publication, collaboration pattern among authors, significant journals, top funding agencies, highly contributing publishers, the most globally cited publication, etc. The present research identifies the role libraries could play in times of disaster or emergency. Libraries, being the information hub for future and present generations, could ensure to provide accurate & valid information to their users, enhancing resource sharing, supporting communities during a crisis. While focusing on modern advanced technology and digital services, a manageable disaster management plan would help these libraries to overcome the time of crisis efficiently. The study also focuses on various research gaps, to provide recommendations for future studies for research scholars, library professionals, various stakeholders, and policy-makers to keenly analyse these factors and enhance their role in preparedness for disasters in times to come.

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Sakshi Jain is qualified for the UGC NET JRF and is currently enrolled in the Department of Library & Information Science at Babasaheb Bhimrao Ambedkar University, Lucknow, as a Research Scholar. Her areas of interest are user studies, digital libraries, library automation and sustainable libraries. As the main author, she conceptualized the study, designed the

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Dr. Sharad Kumar Sonkar is presently working as Professor & Head of the Department of Library and Information Science, Babasaheb Bhimrao Ambedkar University Lucknow. before joining this university. He has also worked in various Universities and Institutions like Banaras Hindu University (BHU), Varanasi, Defence Scientific Documentation Centre (DESIDOC), New Delhi, Rajiv Gandhi University of Health Sciences (RGUHS), Bangalore, National Centre of Science Information, Indian Institute of Science IISc), Bangalore, Bundelkhand University, Jhansi. He is a prolific Library and Information Science academician, who has guided over (07) Doctoral Thesis, (13) M. Phil, (90) Master Dissertations. He has published (56) papers in various National and International conference proceedings, (92) research papers in journals of repute at National & International level and (02) books. Recognized with Best Scientist and Best Teacher awards, he specializes in Information Technology, Digital Libraries, and Library Automation.



Evolving Scholarship in South Asia: Bibliometric Insights from the University of Kashmir

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Abstract

Purpose: The study aims to map and evaluate the research performance, publication trends, thematic focus, and collaboration patterns of the School of Social Sciences at the University of Kashmir over 40 years, highlighting its scholarly contributions and identifying growth opportunities.

Design/methodology/approach: A bibliometric analysis was conducted using data retrieved from Elsevier's Scopus database for the period 1985–2025, as no indexed publications were available before 1985. The search query targeted the institutional affiliation (AF-ID 60016300) within the Social Sciences subject area, yielding 977 publications. Data were analysed using Biblioshiny and VOSviewer to examine indicators such as annual scientific production, document types, citation patterns, co-authorship networks, institutional collaborations, thematic mapping, and keyword co-occurrence.

Findings: The School of Social Sciences accounts for 5.8% of the University's total research output, with marked growth in productivity since 2010. Journal articles dominate (77.08%), but only 25.99% of publications are open access. A strong co-authorship network exists, led by a few highly prolific authors, though collaboration is largely national. Thematic analysis reveals a concentration on regional issues (e.g., Kashmir, conflict, climate change) alongside emerging interdisciplinary areas such as deep learning and sustainable development. Citation impact has increased notably post-2010, peaking in 2020.

Originality/value: This is the first comprehensive bibliometric assessment of the School of Social Sciences at the University of Kashmir. By integrating performance indicators, collaboration mapping, and thematic evolution analysis, the study provides actionable insights to enhance research visibility, diversify thematic focus, and foster international partnerships.

Keywords: Bibliometrics, University of Kashmir, School of Social Sciences, Research Trends, Collaboration, Open Access, Co-authorship Network

Introduction

In the contemporary knowledge economy, research plays a vital role in advancing societal development, informing evidence-based policymaking, and shaping innovation-driven growth (Goduni, 2024; Kayyali, 2024). The global research landscape has witnessed a remarkable surge in scholarly output, particularly from higher education institutions, largely fuelled by technological advancements such as Artificial Intelligence (AI), big data

analytics, and digital infrastructure (Annapareddy, 2025). Scholarly output reflects the intellectual strength of an institution, enhances teaching quality, and fosters a culture of inquiry and critical thinking (Vaishya et al., 2025). Moreover, universities are accredited based on a range of quantitative and qualitative indicators that assess their performance across multiple dimensions, including teaching, research, internationalisation, and societal impact (Qazi & Al-Mhdawi, 2025). Leading ranking systems such as Quacquarelli Symonds (QS), Times Higher Education (THE), Academic Ranking of World Universities (ARWU), and the National Assessment and Accreditation Council (NAAC) rank universities on several parameters (Busurmankulova et al., 2025). Research output is considered one of the most important parameters, as it directly reflects the institution's contribution to advancing knowledge, innovation, and societal development (Toth et al., 2024). As a result, universities have emerged as key contributors to global knowledge production, often outperforming traditional research institutions through the active participation of doctoral students and academic faculty (Clark, 2023).

In India, the research ecosystem has become increasingly vibrant, with several universities, such as Jawaharlal Nehru University, Jamia Hamdard, the University of Delhi, and the University of Kashmir, making substantial contributions across various disciplines. The University of Kashmir, located in Srinagar, Jammu and Kashmir (India), has emerged as a leading institution for higher education and research in northern India. In recognition of its academic excellence, it was recently awarded the highest accreditation grade, A++, by the NAAC, a statutory body responsible for assessing and ensuring the quality of higher education institutions in India (NAAC, 2025). This accreditation reflects the university's outstanding performance across key parameters, including teaching, research, infrastructure, and governance (Aithal et al., 2016; Wagay & Dutta, 2023). The university offers a wide range of academic programs across faculties, including Arts, Business & Management Studies, Education, Law, Sciences, Engineering, and the Social Sciences.

Among these, the School of Social Sciences has emerged as a dynamic and interdisciplinary unit offering programs in Sociology, Political Science, Library and Information Science, Economics, and History (Brandmayr, 2025). This school plays a critical role in fostering civic awareness, ethical responsibility, and policy-relevant research addressing regional and national issues (Mdikana, 2025). Like natural sciences and humanities, social sciences contribute significantly to a university's research output by engaging with complex societal challenges and promoting evidence-based approaches to governance, development, inequality, and social justice (Grillitsch & Sotarauta, 2024; McDermott, 2025; Ruhana et al., 2024).

Information technology has not only facilitated interdisciplinary collaboration but also broadened the scope of scholarly inquiry (Tarafdar & Davison, 2018). This has resulted in a growing volume of academic publications, making it increasingly difficult for researchers to stay current with emerging trends and relevant literature. In this context, bibliometric analysis has emerged as a robust methodological approach to evaluate scholarly output systematically, assess research impact, enabling insights into citation patterns, co-authorship networks, journal impact, thematic evolution across fields (Alam et al., 2025; Kumar, 2025) and map intellectual structures across disciplines (Donthu et al., 2021). In today's era of open science and digital publication, bibliometrics is increasingly used by researchers, institutions, and policymakers to inform decisions on funding, research planning, and institutional strategy (Betouil et al., 2025; Tang et al., 2024).

Despite the growing scholarly activity in the region, focused bibliometric assessments of research trends and collaboration networks within the University of Kashmir's School of Social Sciences remain largely unexplored. While some prior studies have evaluated the broader research output in Jammu and Kashmir (Hamade et al., 2017; Malik et al., 2021; Pandita, 2015), none have specifically analyzed publication productivity, thematic evolution, and collaborative patterns in this school. Therefore, the study aims to bridge that gap by employing bibliometric analysis using the Scopus database to examine the research performance of the School of Social Sciences at the University of Kashmir. The study evaluates trends in publication output, co-authorship networks, preferred journals, and thematic concentrations, offering a comprehensive understanding of the school's scholarly contributions over time.

Review of Literature

Bibliometric research has gained global recognition as a systematic approach to evaluate the growth, structure, and dynamics of scholarly literature. Studies by Bornmann and Mutz (2015) and Zupic and Čater (2014) have laid the foundation for understanding research productivity, collaboration patterns, and thematic evolution using bibliometric tools like VOSviewer, SciMAT, and Bibliometrix. Donthu et al. (2021) offered practical guidelines for conducting bibliometric analyses, emphasizing their applicability across disciplines, such as Folate Receptor Research (Didion & Henne, 2020), Bioinformatics Literature (Veeramuthu, 2023), Genetic Engineering (Mareeswari et al., 2014), Bio-Technology Literature (De la Vega Hernández et al., 2024), and cryptocurrencies (Jan & Haq, 2024). These studies have been conducted in the past and continue to be carried out to quantitatively assess scholarly output across disciplines based on several parameters and indices. Sweileh (2021) provided a global overview of e-

learning research in higher education and demonstrated how bibliometric techniques could reveal emerging trends in social sciences. Similarly, Aria and Cuccurullo (2017) introduced the Bibliometrix R package, which has become essential for mapping science and analyzing performance indicators such as total publications, h-index, and co-citation networks. These studies collectively underscore the importance of bibliometric methods in capturing the intellectual and structural patterns of academic research across disciplines and regions. Dessa and Dani (2025) analyzed research trends at the University of Debrecen's Faculty of Informatics using Scopus data, noting a rise in publications focused on machine learning, virtual reality, and deep learning. Key publication venues included *Lecture Notes in Computer Science* and *Annales Mathematicae*. Another study by Haq (2020) on Social Science research in Pakistan identified the *Pakistan Development Review* as the most preferred journal and the United States as the most preferred country for international research collaboration. Similarly, Yan et al. (2022) conducted a study in China that identified various research hotspots in the field of research data, including data literacy education, research data sharing, data integration management, joint library cataloguing, and data research support services.

In the Indian context, the social sciences are witnessing a steady rise in scholarly output, particularly from institutions such as Jawaharlal Nehru University, Delhi University, and the University of Hyderabad (Ali et al., 2024). Nishavathi and Jeyshankar (2018) analysed the research output of the All-India Institute of Medical Sciences (AIIMS) over 10 years, based on records retrieved from the Scopus database. The study identified journals as the most preferred publication pattern, with the *Indian Journal of Paediatrics*, *Indian Journal of Medical Research*, and *Indian Paediatrics* being the most preferred journals. Patra (2021) conducted a bibliometric analysis of library and information science research in Indian universities and reported a high degree of collaboration, increased journal publications, and concentration in core journals. Region-specific studies, such as those by Rehman et al. (2023), have highlighted growing research productivity in Kashmir, especially in Library and Information Science (LIS), Human Resource Management (HRM), and governance-related fields. The University of Kashmir has contributed significantly to this trend, as evidenced by the publication of the *Kashmir Journal of Social Sciences* and numerous faculty-led publications in Scopus and WoS-indexed journals. Wani and Ganaie (2022) explored grey literature and demonstrated the use of bibliometric visualisation tools to uncover evolving themes and author networks. Other studies, such as those by Chadegani et al. (2013) and Gerasimov et al. (2024), provide comparative insights into databases such as Scopus and Web of Science, which are critical for assessing publication trends, citation impact, and open-access availability. These developments suggest that a comprehensive bibliometric

study of the University of Kashmir's School of Social Sciences, considering publication trends, author productivity, collaboration networks, open access, and thematic evolution, can be effectively positioned within the broader national and international research landscape.

Research Questions of the Study

- RQ1: What are the key publication trends, subject areas, and types of scholarly output in the School of Social Sciences at the University of Kashmir?
- RQ2: What is the nature and accessibility of publications, and how does data flow reflect the structural trends in research output?
- RQ3: Who are the leading contributors to research, and how has their productivity and collaboration evolved?
- RQ4: What are the key research themes and their evolution over time as reflected through keyword analysis and thematic mapping?

Methodology

Bibliometric analyses rely extensively on robust quantitative data sourced from reputable bibliographic databases (Gan et al., 2022). In this study, bibliographic data were retrieved from Elsevier's Scopus database, specifically targeting publications affiliated with the School of Social Sciences at the University of Kashmir as of 28 June 2025. The search was executed using the search string:

AF-ID (60016300) AND SUBJAREA (SOC) AND (LIMIT-TO
(SUBJAREA, "SOC"))

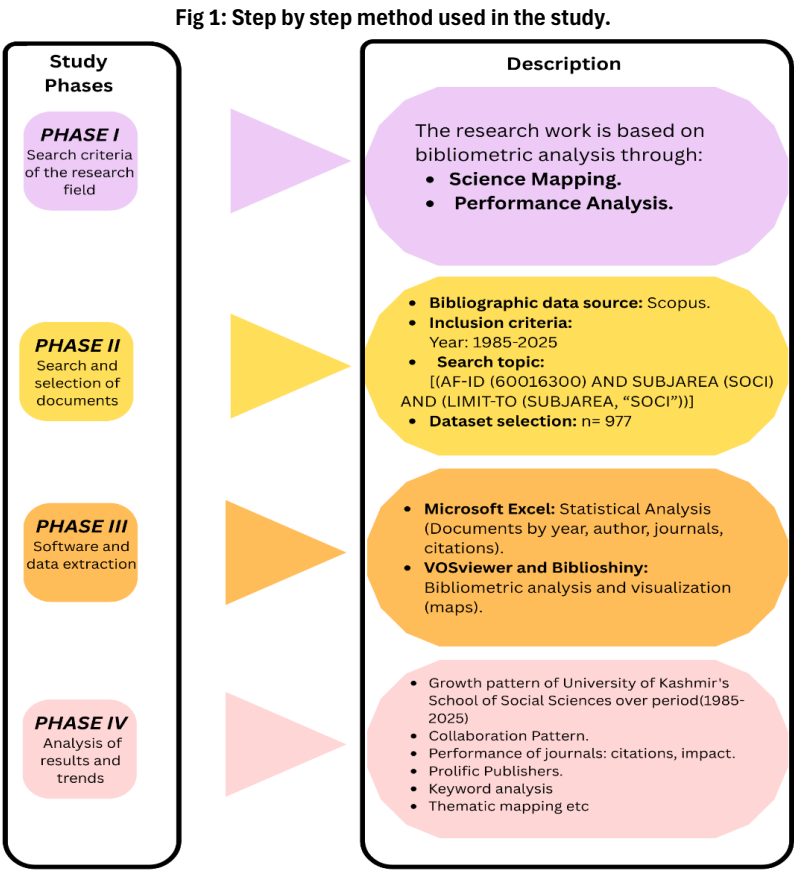
The study period was defined from 1985 to 28 June 2025, as no indexed publications from the School of Social Sciences were found in Scopus before 1985. The search yielded 977 publications, which were exported to CSV for detailed examination.

All document types indexed in Scopus under the selected institutional and subject area criteria were included, encompassing articles, conference papers, letters, books, book chapters, reviews, notes, short surveys, errata, and editorials. Only publications indexed under the subject area Social Sciences were considered. Data cleaning involved removing inconsistencies through automated processes and manual verification.

Data Analysis

The extracted data included document titles, publication years, document types, citation counts, author keywords, source titles, source types (journals, conference proceedings, books, and book series), and access types (open access and non-open access). The conceptual structure of research produced by the School of Social Sciences was examined through word clouds, thematic mapping, and author keyword co-occurrence over time,

providing insights into research trajectories and dominant themes. Analyses and visualisations were conducted using the open-source software tools Biblioshiny and VOSviewer, ensuring reproducibility and clarity in mapping the research landscape. The step-by-step methodology is shown in Fig. 1.



Data Analysis and Interpretation

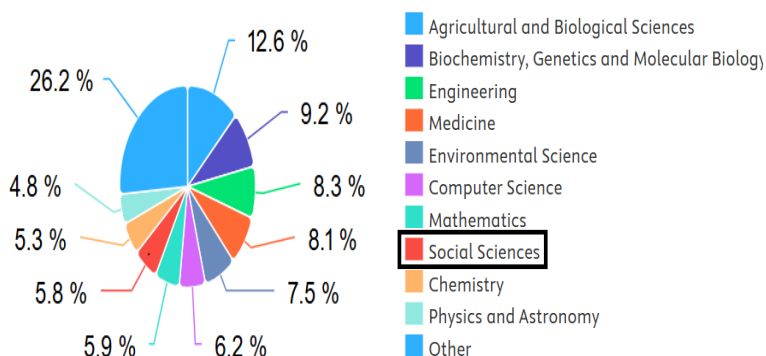
RQ1: *What are the key publication trends, subject areas, and types of scholarly output in the School of Social Sciences at the University of Kashmir?*

Subject Trends

Social Sciences account for 5.8% of the University of Kashmir’s total Scopus-indexed research output during the specific period, as depicted in Fig. 2. While this may appear modest in comparison to Science, Technology, Engineering & Mathematics (STEM) fields such as Agriculture and Biological Sciences (12.6%) or Biochemistry and Molecular Biology (9.2%), it

nonetheless reflects a visible and active scholarly presence in disciplines such as sociology, political science, economics, education, and public policy. The data reflect that while the University of Kashmir maintains a science-heavy research orientation, there is also meaningful scholarly activity in social sciences and interdisciplinary areas. This distribution suggests the potential to further strengthen social science research by aligning it with institutional priorities and regional development goals, especially through interdisciplinary collaborations.

Fig. 2: Scholarly output of various disciplines of the University of Kashmir



Document type:

Most publications were journal articles, accounting for 753 documents (77.08%), followed by book chapters (115; 11.77%), conference papers (51; 5.22%), and reviews (37; 3.79%). Other less frequent types included letters and errata (5 each; 0.52%), notes (4; 0.40%), books (3; 0.30%), short surveys (2; 0.20%), and retracted documents and editorials (1 each; 0.10%).

Overall Publications data:

Fig. 3 summarises the overall bibliometric characteristics of publications linked to the School of Social Sciences, generated using the Biblioshiny software based on Scopus bibliographic data. The dataset spans the period 1985–2025, comprising 977 scholarly documents published across 432 distinct sources (including journals and edited book chapters) with an observed annual growth rate of 11.88% in publication output.

Over this four-decade period, 1,448 unique authors contributed to this body of work, representing a diverse mix of local and international affiliations. The data also revealed collaborations with 162 different institutions, 13% of which involved international partnerships. The average number of co-authors per document was 3.27, and 102 documents were single-authored, reflecting a healthy blend of individual and collaborative research

contributions to this field. The average document age is 4.87 years, while the average citation per document is 8.59, highlighting the moderate yet impactful nature of the research output.

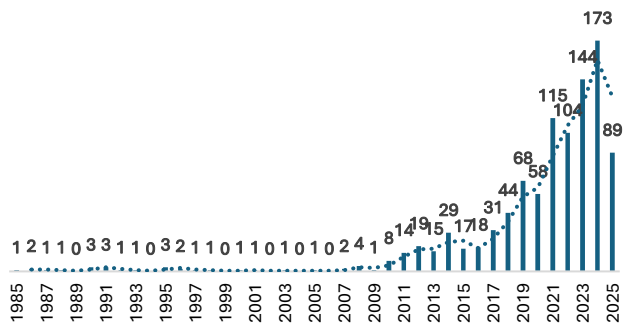
Fig. 3: Overall publication data based on the Scopus database



Annual Scientific Production

Since 1985, the School of Social Sciences at the University of Kashmir has consistently contributed to the scholarly literature through journal articles, book chapters, and conference proceedings across its various departments. Fig. 4 illustrates the annual scientific output of the School of Social Sciences affiliated with the University of Kashmir, based on data indexed in the Scopus database. The first indexed publication dates to 1985. Notably, no publications were recorded in 1990, 1994, 2000, 2002, and 2006. A marked increase in scholarly productivity was observed from 2010 onwards. Significant milestones include 14 publications in 2012, 29 in 2014, 68 in 2018, and 115 in 2021. The year 2024 stands out as the most productive year to date, with 173 publications. As of June 2025, the cutoff date for data collection, 89 publications had already been recorded, indicating a sustained upward trend in research output.

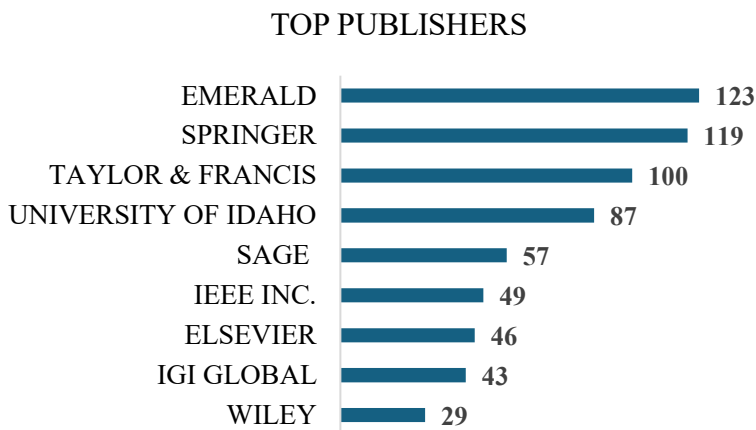
Fig. 4: Annual Scientific Production



Publisher-wise Distribution of Publications

The analysis of publication output by researchers from the School of Social Sciences, University of Kashmir, is shown in Fig. 5, which reveals that a significant portion of their research is published in reputable international journals. Emerald leads as the most preferred publisher with 123 publications, as evidenced by the productivity of journals such as Library Hi-Tech, Collection and Curation, and Online Information Review, as previously shown in the source productivity, reflecting a strong inclination toward management, education, and social science disciplines that Emerald typically covers. Springer ranks second with 109 papers, indicating substantial engagement with interdisciplinary, peer-reviewed platforms known for their high-impact academic output. Taylor & Francis with 100 papers ranked third in the list. Notably, the University of Idaho appears with 87 publications, evident in the journal's productivity in Library Philosophy and Practice (87), likely through open-access or institutional repositories, suggesting collaboration or a preference for freely accessible publication channels. Other prominent publishers include SAGE (57), IEEE Inc. (49) all of which are well-known for their contributions to the humanities, technology and social sciences. Furthermore, publishers such as Elsevier (46) and IGI Global (43) demonstrate consistent academic output. Wiley though with fewer publications (27), remains a recognised outlet for quality scholarship, adding to the overall diversity of the publication sources.

Fig. 5: Publisher-wise distribution of Publications



RQ2: What is the nature and accessibility of publications, and how does data flow reflect the structural trends in research output?

Visualization of Scholarly Output and Collaboration Patterns Using Sankey Diagram

Fig. 6 is a Sankey diagram, a powerful visual tool for representing the flow of information, resources, or data between interconnected elements. It uses arrows or links of varying widths to depict the magnitude of relationships, making it particularly effective for analysing and communicating complex systems and large datasets. In bibliometric research, Sankey diagrams are commonly used to illustrate relationships among variables such as publication sources, authorship patterns, collaboration types, and growth trends in scholarly output. According to Lee et al. (2022), Sankey diagrams provide a clear and intuitive way to present resource distribution and relational dynamics, thereby helping researchers and readers better grasp the underlying data structure in fields such as bibliometrics and information science.

In the present study, Fig. 6 visualises the scholarly publication trends based on data extracted from the Scopus database over 40 years. The flow begins with a single main source, the Scopus Database [1985–2025], which branches into 432 Sources, representing the number of journals or publication outlets contributing to the dataset. From these sources, the flow continues to 977 Documents, symbolising the total number of research outputs indexed within the defined timeframe. These documents further break down into four key categories: Annual Growth Rate (11.88%), Open Access publications (254), Closed Access publications (723), and Authors (1448). This structure reveals the accessibility dimension of the publications (open vs. closed access).

The “Authors” node bifurcates into Single-Authored documents (102) and multi-authored documents (875), emphasizing the dominance of collaborative research. Further refinement of collaboration is depicted under multi-authored documents, which are split into National Co-authorship (761) and International Co-authorship (114). This segmentation highlights the significant role of intra-country collaborations in the research landscape compared to global partnerships.

Nature of publications (Open Access vs Closed Access):

During the study period, 74.01% publications (723) were published in closed access mode and the remaining 25.99% publications (254) in open access (All open Access, Gold, Green, Hybrid Gold, and Bronze) out of a total of 977 publications, as depicted in Fig. 7. This indicates that a large proportion (74.01%) of publications are still published in a traditional paywall model. It was observed that out of 254 OA publications, 115 were All Open Access,

followed by 70 Gold, 36 Green, and the remaining 17 and 16 were Hybrid Gold and Bronze, respectively.

Fig. 6: Visualization of data flow through Sankey diagram.

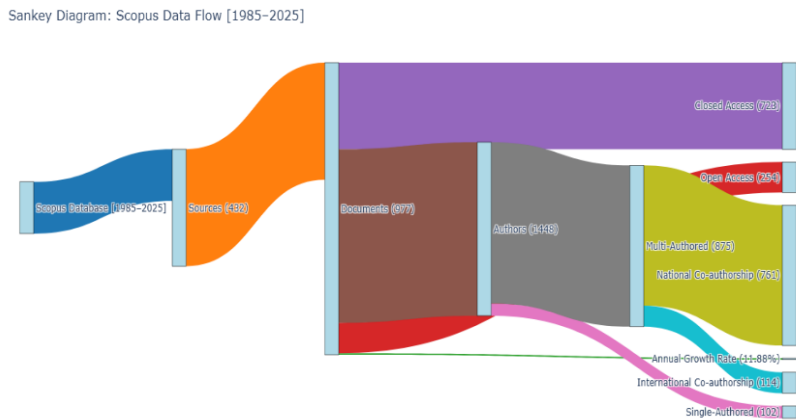
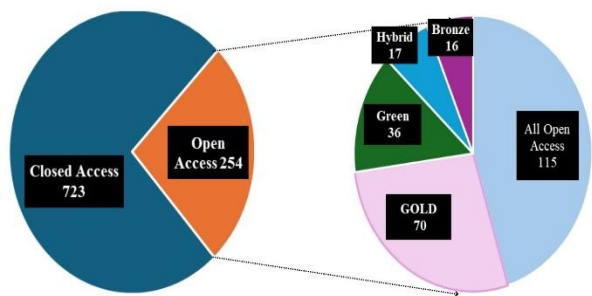


Fig. 7: Nature of Publications



Most relevant sources

In this section, the study explored the most relevant sources (journals) in which researchers from the Faculty of Social Sciences published their research work. The top ten sources by number of publications were identified. The journal “Library Philosophy and Practice” is the most relevant source, with 87 articles, followed by “Reliability: Theory and Applications,” with 27 articles. Possible reasons include that both journals offer open-access publishing, which increases visibility and citation potential. Furthermore, *Library Philosophy and Practice* is known for its accessibility and high readership among library and information science communities globally. Likewise, “Geojournal” and “Global Knowledge Memory and

Communication” are the third- and fourth-most productive journals, with 23 articles each. Additionally, the “IEEE 5th International Symposium on Emerging Trends” and “Sustainability (Switzerland)” were found to be the least contributing sources, with 12 articles each.

RQ3: Who are the leading contributors to research, and how has their productivity and collaboration evolved?

Author Productivity

Table 1 shows the most relevant authors, with GUL S as the most prolific contributor, with 67 articles, followed by LOAN FA (46), GANAIE SA (35), and SHAH SA (29). The dominance of these authors may be attributed to their deep engagement with the research domain, active participation in collaborative networks and strong affiliations with productive research institutions. Their frequent appearances in the literature may also reflect their leadership roles in projects, mentorship of research groups, or consistent focus on trending topics within the field, making them key figures in shaping scholarly discourse and development.

Table 1: Most Prolific Authors

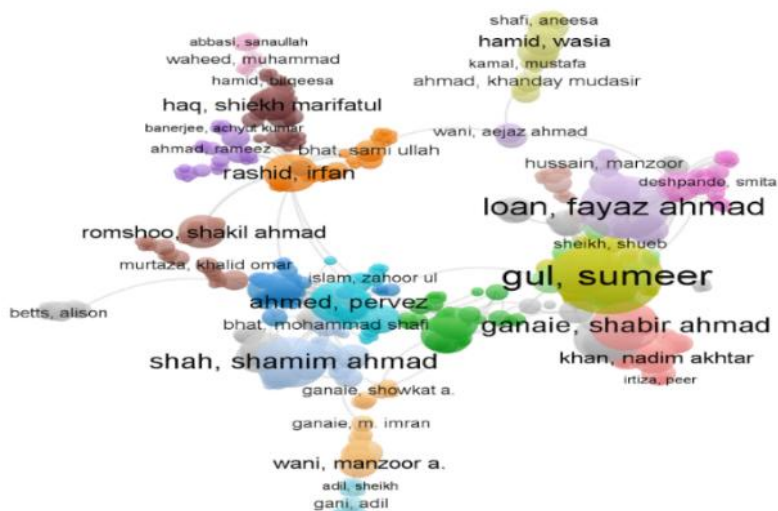
Authors	No. of Pub.	Articles Fractionalize	Scopus ID	Department
Gul S	67	20.10	24401206700	Library and Information Science
Loan FA	46	22.00	41961328500	
Ganaie SA	35	15.30	55745889700	
Shah SA	29	8.00	57191029648	Geography
Wani ZA	27	11.50	24402207400	Library and Information Science
Shah TA	24	6.30	35775573600	
Sheikh S	18	4.70	56768179900	
Rashid I	17	4.20	57202041503	Management Studies
Ahmed P	21	4.30	55620501800	Geography

Co-authorship Network

To visualise the co-authorship of the researchers, we used VOSviewer with Scopus bibliographic data in CSV format. Following this procedure, we created a map based on bibliographic data shown in Fig. 8. A total of 517 items were identified and distributed across 26 distinct clusters, with 1448 unique authors included in the dataset. The analysis was conducted with a minimum threshold of 1 document per author and a maximum of 25 authors per document. The co-authorship network reveals a robust, well-integrated academic community. Notably, Gul Sumeer emerges as the most prominent author, with the highest number of collaborative links (68) and the highest total link strength (187), reflecting a central role in fostering academic

partnerships. Following closely, Loan, Fayaz Ahmad secures the second position with 23 links and a total link strength of 62, while Ganaie, Shabir Ahmad occupies the third position, establishing 17 links and a total link strength of 38. All three authors belong to the field of Library and Information Science and serve as pivotal nodes within the network, indicating frequent co-authorship and strong collaborative influence. Furthermore, Shah, Shamim Ahmad, with 26 links and a total link strength of 86 from the Department of Geography, and Rashid, Irfan, with 42 links and a total link strength of 58 from Management Studies, were also among the main contributing authors. The substantial node sizes and high connectivity of these authors indicate their deep integration into the research ecosystem and their contributions to driving knowledge dissemination. Moreover, their proximity to multiple clusters underscores their involvement in interdisciplinary collaborations, enhancing visibility across diverse scholarly domains. Conversely, peripheral nodes with limited links may signify either emerging researchers or individuals contributing to more specialised niche areas. The presence of densely connected clusters also points to established research groups, likely anchored in specific institutions or thematic areas, underscoring the critical role of strategic academic collaboration in amplifying research productivity and scholarly impact.

Fig. 8: Co-authorship Visualisation

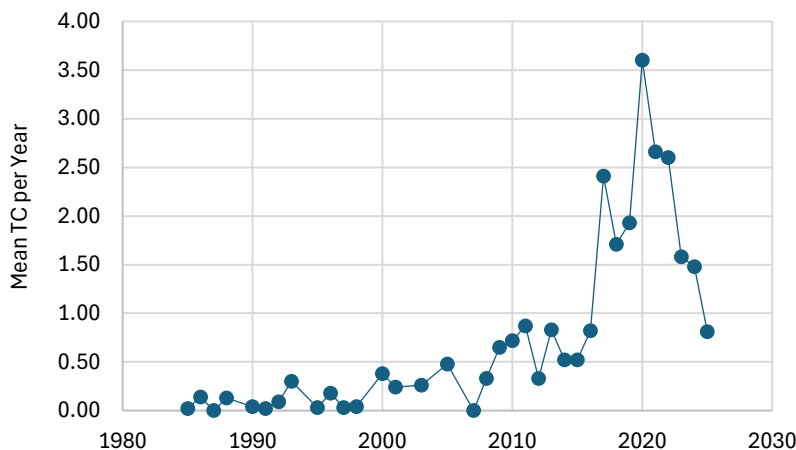


RQ4: What are the key research themes and their evolution over time as reflected through keyword analysis and thematic mapping?

Mean Total Citations per Year

The analysis of the Mean Total Citations per year (Mean TC per Year) from 1985 to 2025, shown in Fig. 9, reveals a dynamic evolution in the citation impact of scholarly publications. During the initial period from 1985 to 2005, citation rates remained consistently low, often below 0.5, indicating limited research visibility, lower output, and minimal indexing in high-impact databases. A notable shift began around 2009, with MeanTCperYear gradually increasing from 0.65 in 2009 to 0.87 in 2011, marking the start of a growth phase likely driven by improved research quality, increased academic collaboration, and greater digital accessibility. The period from 2017 to 2022 was the most impactful, with citation rates peaking at 3.60 in 2020, possibly due to research on the COVID-19 pandemic and heightened global scholarly engagement. Other significant citation highs were observed in 2019 (1.93), 2021 (2.66), and 2022 (2.60), highlighting the sustained relevance of this research. However, a slight decline is observed from 2023 onwards, with the rate decreasing to 0.81 in 2025, which can be attributed to citation lag, where newer publications have not yet accumulated citations. Overall, the data demonstrate a strong upward trajectory in research influence post-2010, indicating enhanced academic contributions and the growing impact of scholarly communication over time.

Fig. 9: Mean Total Citations Per Year



Keyword Analysis

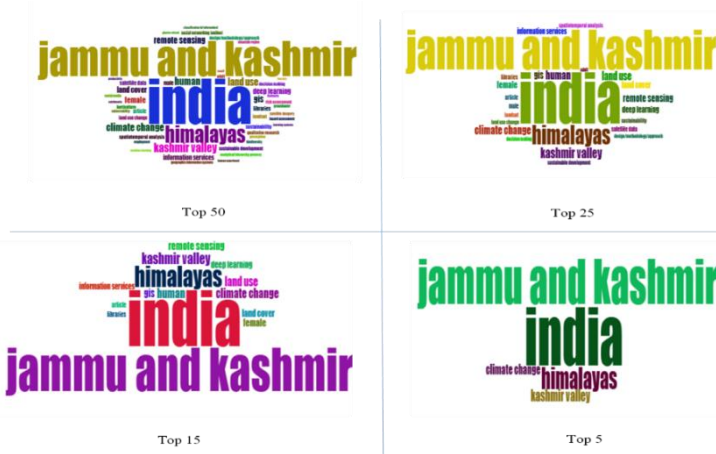
Keyword analysis in bibliometrics examines the frequency, patterns, and relationships of keywords within a set of scholarly publications. It helps identify the main themes, research trends, and conceptual structure of a given research field or topic (Wang & Chai, 2018). Keywords used in publications often reflect the current state of research on a given topic (Lu et al., 2021). Prior studies have primarily focused on identifying key research areas and analysing emerging trends by evaluating the frequency and distribution of keywords (Chen et al., 2024; Mounika et al., 2025; Wu et al., 2024). Table 2 shows the top 10 keywords mostly utilized during the specified sample period.

The keyword analysis reveals that “Kashmir” is the most frequently occurring term, appearing 59 times, followed by “India” with 50 mentions, “Open Access” with 31 mentions, and “Bibliometrics” with 27 mentions. Notably, among the most frequently appearing terms, Covid-19, Scientometrics, Conflict, social media, Libraries and Remote Sensing also feature prominently, indicating their significant presence within the top 10 keywords. A word cloud analysis was also conducted, wherein the relative prominence of each term is visually represented through variations in font size. This technique intuitively reflects the frequency or perceived importance of keywords within the text. Consistent with the methodological approach proposed by Callon et al. (1983), terms that appear more frequently are displayed in larger fonts and arranged in a visually engaging format. As illustrated in Fig. 10, the most salient keywords emerging from this top-5 keyword analysis are “India”, “Jammu and Kashmir”, “Himalayas”, “Kashmir valley”, and “climate change”, each underscoring the literature’s thematic focus. As the number of keywords expands to 15 and 25, additional themes such as “remote sensing,” “GIS,” “land use,” and “information services” emerge, reflecting a growing engagement with technological tools and environmental analysis. The 50-keyword image presents the greatest thematic diversity, incorporating interdisciplinary subjects such as “deep learning,” “sustainable development,” “libraries,” and “female,” indicating the integration of data science, gender studies, and development issues into regional research. This progression from a core geographic focus to multifaceted, interdisciplinary inquiry underscores the deepening complexity and maturity of the academic literature on Jammu and Kashmir.

Table 2: Keyword Frequency

Keyword	Frequency	Keyword	Frequency
Kashmir	59	Scientometrics	18
India	50	Conflict	17
Open Access	31	Social Media	17
Bibliometrics	27	Libraries	15
Covid-19	21	Remote Sensing	15

Fig. 10: Keyword Analysis



Thematic Map

In conceptual structure analysis, a thematic map is generated to visualise themes or conceptual clusters in a research domain, typically using co-word analysis, as shown in Fig. 11. It helps identify the main topics, emerging trends, and developmental status of various themes in the literature: centrality (relevance degree) on the x-axis and density (development degree) on the y-axis. In the Motor Themes quadrant (high centrality, high density), themes such as deep learning, learning systems, machine learning, India, Jammu and Kashmir, and the Himalayas are prominently positioned. These are well-developed and essential to the research field, reflecting strong integration and maturity. Their dominance suggests that regional and geographical studies, likely in environmental, sociopolitical, or developmental contexts, are central and evolving areas of research.

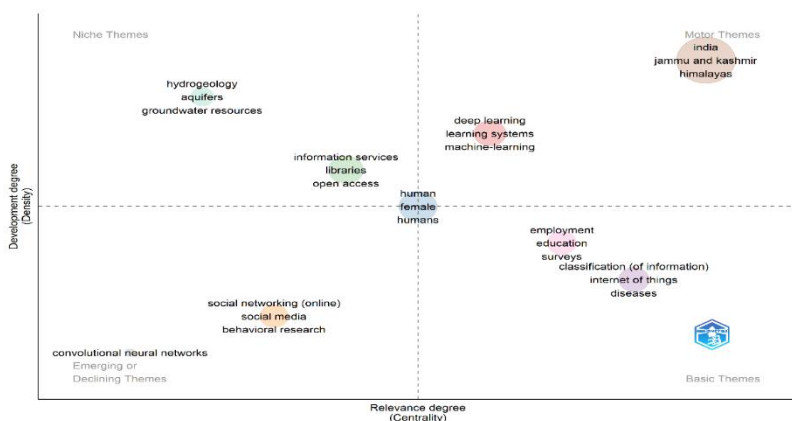
The Niche Themes quadrant (low centrality, high density) includes specialised topics such as *information services*, *libraries*, *open access*, *hydrogeology*, *aquifers*, and *groundwater resources*. Although well-developed internally, these topics are less closely connected to other themes, suggesting they serve a specific sub-community or specialised domain within the broader research field.

In the Basic Themes quadrant (high centrality, low density), terms such as *employment*, *education*, *surveys*, *classification (of information)*, *Internet of Things*, and *diseases* appear. These are foundational yet underdeveloped themes, highlighting their broad relevance across disciplines and suggesting the need for deeper exploration and development.

The Emerging or Declining Themes quadrant (low centrality, low density) includes terms such as *social networking (online)*, *social media*, *behavioural research*, and *convolutional neural networks*. Their marginal position could

indicate a nascent or waning interest in this specific field. These may be emerging concepts yet to be fully integrated into mainstream discourse, or previously prominent topics that have experienced a decline in scholarly attention.

Fig. 11: Thematic Map



Discussion

The results of this bibliometric analysis reveal several interesting patterns that highlight the advantages and disadvantages of the research conducted by the University of Kashmir's School of Social Sciences. First, although making up only 5.8% of the university's total research output, the increasing trend in publication volume, particularly from 2010 onward, indicates that scholarly interest in the social sciences is growing. Such a trend parallels national trends in Indian academia, where social science research, although historically overshadowed by STEM disciplines, is gaining traction through interdisciplinary approaches and digital accessibility (Uddin et al., 2020). Journal papers make up the majority (77.08%), suggesting a strong preference for conventional peer-reviewed publication. This pattern aligns with international academic standards, where journal publishing remains the most reliable means of scientific validation (Pluemer et al., 2025). However, the comparatively lower numbers of books and conference papers highlight potential areas for diversification, especially given that conferences can foster early-stage collaborations and that books offer deeper, contextualised insights that are often crucial in social science disciplines. With only 14.22% of publications freely accessible, open access is still a problem. Open-access methods, on the other hand, have led to increased citations and wider dissemination (Langham-Putrow et al., 2021). The University of Kashmir could benefit from institutional policies promoting gold and green open-access routes to increase research visibility. Another important conclusion

from citation analysis is a sharp rise in citations after 2010, which peaked in 2020. This is consistent with global trends where research engagement and dissemination were accelerated by COVID-19 and digital scholarship (Else, 2020). The observed dip in 2023–2025 is not unusual and is likely due to the lag time in citation accrual for recent publications (Waltman, 2016). Additionally, thematic analysis shows that region-specific subjects, including war, India, and Kashmir, dominate scholarly attention. As a sign of influential social science research, this implies that the School of Social Sciences is not only making contributions to international scholarship but is also actively involved in local and regional socio-political realities (Anheier, 2023). Promoting more interdisciplinary connections, particularly with data science and computational social science, could put the faculty at the forefront of cutting-edge research, as new fields such as deep learning and neural networks remain under-studied.

A strong co-authorship network suggests a cohesive academic community. Leading authors such as Loan Fayaz Ahmad and Gul Sumeer serve as centres of collaboration, and their strong ties point to a positive cooperative culture. This is consistent with the broader body of research demonstrating that teamwork often leads to greater citation impact and wider distribution (Schmutz et al., 2019). Finally, a certain thematic or disciplinary orientation, primarily within library science and management, is implied by the concentration of publications in a small number of journals, such as *Library Philosophy and Practice* and *Reliability: Theory and Applications*. To increase interdisciplinary reach and diversify impact, this guarantees depth but also makes the case for investigating new journals and fields.

Conclusion

In simple terms, the study shows that the School of Social Sciences at the University of Kashmir is actively growing into a research hub, even though it still accounts for only a small share of the university's overall research output. Research activity has grown over time, especially since 2010, and numerous academics are collaborating across departments and even abroad. This partnership bodes well for the future. The study also shows that most work is shared through journal articles, but few are publicly accessible. Making more research open access could help the work reach more people and get more recognition. Topics such as Kashmir, conflict, and public policy are common, indicating that the researchers are focusing on real, local issues that matter to the region. Authors like Loan Fayaz Ahmad and Gul Sumeer are important contributors who collaborate on numerous initiatives to assist others. The school is developing a strong research identity thanks to this collaboration. However, there is still more the school can do to expand, particularly by investigating new areas of study, adopting new technologies, and publishing in more international journals. In summary, the School of

Social Sciences is headed in the right direction, even though there is still opportunity for improvement. It may significantly contribute to scholarly conversations in India and beyond by improving access to research, expanding the range of themes, and fostering greater collaboration.

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National-Level Assessment of LIS Doctoral Theses in Shodhganga: A Metadata driven Study

Vinay Manral
Riya Raj
Vinit Kumar

Abstract

The study assesses the current status and growth of the library and information science (LIS) doctoral-level theses deposited in Shodhganga, India's national digital repository for theses and dissertations. A quantitative metadata-based approach was adopted. Bibliographic records of LIS theses covering the period 2010-2025 were manually extracted from Shodhganga. Initially, bibliographic records of 4,400 LIS doctoral theses from 166 universities were collected. After data cleaning and organizing them in excel sheets, a final dataset of 4,027 LIS theses from 156 universities was analyzed. The analysis reveals that Bharathiar University emerged as the most productive institution by depositing 153 LIS theses, followed by Karnatak University (126) and Manonmaniam Sundaranar University (125). State universities contributed more than 3/4th of the total LIS doctoral output, while Central universities contributed 11.62%, Private universities 6.98%, and Deemed-to-be universities 4.77%. The annual distribution of doctoral theses shows fluctuations, with a sharp growth after 2015, peaking in the year 2022 with 532 theses, followed by a marginal decline in 2025, which may reflect incomplete reporting for that year. Tamil Nadu dominates at the regional level with 814 theses, ahead of Maharashtra (506) and Karnataka (452). The geospatial mapping highlights a strong concentration of LIS research in southern and western India, with comparatively lower representation in several northern and central regions. This study provides a significant foundation for policy makers, academic planners and LIS educators to identify leading research universities, address regional imbalances, strengthen doctoral programmes and promote awareness regarding the deposition of doctoral research output in the national repository.

Keywords: Shodhganga, LIS doctoral theses, doctoral research output, electronic theses and dissertation (ETD), output analysis

Introduction

Doctoral research reflects the intellectual maturity and research capability of a discipline at both national and global levels. Doctoral output like theses and dissertations represent a significant component of a university's intellectual output. Powell (1995) emphasized that doctoral work in Library and Information Science (LIS) contribute to the generation of new knowledge, strengthen theoretical base of the discipline, and support the professional development of the field. Similarly, Fox et al. (2001) observed that the quality of a university is often reflected in the quality of its students' intellectual products, particularly theses and dissertations, which show the institution's ability to support original research and scholarly advancement. So, the assessment of doctoral research output has increasingly been

recognized as an important indicator of disciplinary growth, institutional research capacity and regional knowledge production.

The emergence of Electronic Theses and Dissertations (ETDs) has significantly transformed the dissemination and accessibility of doctoral research. The global ETD movement began during the 1980s and 1990s through early technological experiments in the United States, including the development of SGML (Standard Generalized Markup Language) based electronic dissertations and the creation of SGML Document Type Definition (DTD) for theses in 1988. Early pilot initiatives at Virginia Tech University converted printed theses into electronic formats and laid the foundation for digital theses submission systems (Cayabyab, 2015; Fox, 2021). In 1997, Virginia Tech mandated electronic-only submission of theses and dissertations. The introduction of Adobe's Portable Document Format (PDF) in the early 1990s further enabled author-produced ETDs more practical.

The ETD movement scaled globally through the establishment of the Networked Digital Library of Theses and Dissertations (NDLTD) during 1996-1997 (Copeland & Penman, 2004), along with international funding initiatives and policy support from UNESCO, that encouraged the adoption of ETDs in developing countries (Dobratz & Schirmbacher, 2001). Several national and regional ETD programmes were launched, such as Joint Information System Committee (JISC) funded e-theses projects in the United Kingdom, the Australasian Digital Theses programme, and the Shodhganga in India. These initiatives integrated the ETDs into repositories and supported the broader open access movement (Bevan, 2005; Copeland, 2008).

Traditionally, doctoral theses were available only in printed form and largely confined to university libraries, limiting their accessibility and visibility. The transition to ETDs has significantly enhanced the visibility, accessibility and reuse of doctoral research, thereby transforming scholarly communication towards a more open, interoperable and collaborative environment (Schöpfel et al., 2014). Institutional and national ETD repositories have played an important role in making previously inaccessible doctoral research globally discoverable. Global aggregators and directories like OpenDOAR, BASE and NDLTD harvest millions of ETD records from institutional repositories and provide unified access to these research outputs, further boosting their impact worldwide (Schöpfel et al., 2025).

In India, the development of ETD infrastructure began with its first institutional repository established at Indian Institute of Technology Bombay in 1999 and the Vidyandhi project launched at the University of Mysore in 2000 (Ghosh, 2009). Although several institutions developed their own individual repositories, there was an absence of a unified national platform. To address this issue, Shodhganga was established in 2010 by the INFLIBNET Center under the University Grants Commission as a national open access digital repository for hosting doctoral theses produced in Indian universities.

Developed using the open-source software DSpace, Shodhganga acts as a centralized repository of Indian doctoral theses (Sheeja, 2011).

The growth of Shodhganga boosted with the UGC (Minimum Standards & Procedure for Award of M.Phil. / Ph.D Degree) Regulations, 2009 and further strengthen by subsequent timely amendments which mandates that before the announcement of the award of the M.Phil/Ph.D. degrees, the concerned institution should deposit an electronic copy of the M.Phil dissertation/ Ph.D thesis to the Shodhganga digital repository (Ministry of Education, 2009, 2016). These regulatory measures significantly increased institutional participation and contributed to the rapid expansion of the repository, as reported by many studies (Chakravarty, 2019; Kalyan, 2021; Panda, 2016). By 2026, the repository hosted more than 660,000 full-text doctoral theses, which highlights its significance among Indian Universities and making it an important platform for dissemination, preservation, and bibliographic control of doctoral research in India (Shodhganga, 2010).

An important feature that enhances the analytical value of ETD repositories is the availability of metadata. Repository metadata elements like author names, institutional affiliations, university categories, geographical locations, date of upload and subject classifications enable analysis of research productivity and institutional participation. Such metadata can be aggregated and analyzed to derive indicators of research productivity, disciplinary growth and institutional research performance (Guerrero-Sosa et al., 2021; Ulrich et al., 2022). The present study utilizes the metadata of LIS doctoral theses available in the Shodhganga to assess the annual growth patterns, institutional contributions, geographical distribution, and distribution among university categories across India.

Review of Literature

Shodhganga has been widely used as a data source for diverse research studies examining repository characteristics, usage patterns, and research productivity. Several studies have focused on repository-level evaluation and user-oriented aspects, highlighting the role of Shodhganga in enhancing scholarly communication and research visibility. For instance, Chakrabarti and Maharana (2025) examined the features and significance of the Shodhganga repository and concluded that it serves as an effective platform for advancing scholarly communication. Similarly, Panda (2016) analysed the growth and development of Shodhganga since its inception and reported a steady increase in institutional participation and thesis submissions over time. User centric studies, such as Sinha & Purkayastha (2018), further indicate growing awareness and utilisation of the repository among academic communities, particularly due to the initiatives undertaken by INFLIBNET. Gopalji et al. (2025) investigated the doctoral thesis trends in top

Centrally Funded Technical Institutions and found major disparities in submission rates and subject focus across institutions.

Other studies have employed Shodhganga data to examine institutional, disciplinary and structural patterns of doctoral research. Nanthini & Varghese (2018) analyzed leading contributing universities, departmental distributions, and subject categories, while Kumar et al. (2023) explored academic genealogy and doctoral supervision patterns using Shodhganga repository data. Similarly, Sivakumaren et al. (2024) examined discipline-wise contributions and language disparities in theses from central universities. These studies collectively demonstrate the potential of Shodhganga metadata for analyzing institutional productivity, research structures and disciplinary trends.

Another important stream of research focuses on metadata-driven and bibliometric analyses of theses and dissertations, both within and beyond Shodhganga. Studies such as Kalyan (2021) have examined overall growth patterns and state-wise contributions, while Mir and Sevukan (2021) analysed LIS doctoral theses to assess their trends, availability and citation impact, revealing relatively low citation visibility (15.68%) of theses. International and institutional-level studies, including Milovanovic et al. (2025) and Pop et al. (2025), have further explored aspects such as thesis quality, gender distribution, keyword co-occurrence and the research output derived from doctoral work. Additionally, institution specific analyses like Maghawry (2025) and Barphe (2023) have provided insights into local research productivity, language patterns and accessibility issues. Collectively, these studies show that ETD metadata can serve as a valuable resource for evaluating research productivity, impact and thematic development.

Despite these contributions, the existing body of literature remains fragmented in scope. Most studies are either limited to repository-level assessments or confined to specific disciplines, institutions or regional contexts. Comprehensive national-level assessment that systematically analyze Shodhganga metadata to know institutional contributions, geographical distribution, university categories and temporal trends within the Library and Information Science (LIS) discipline remain limited. Addressing this gap, the present study provides a metadata-driven assessment of LIS doctoral theses available in Shodhganga to examine their current status, growth trends, institutional distribution and regional disparities.

Objectives

- a) To analyze the annual distribution and trends of LIS doctoral theses uploaded in Shodhganga from 2010 to 2025.

- b) To identify the leading universities contributing to LIS doctoral research in India.
- c) To examine the geographical distribution and regional patterns of LIS doctoral theses across India.
- d) To analyse the contribution of different categories of universities (State, Central, Private, and Deemed-to-be) and determine leading universities within each category.

Methodology

The study is quantitative in nature and based on the analysis of metadata of Library and Information Science (LIS) doctoral theses available in Shodhganga repository. Metadata records of LIS doctoral theses were browsed and extracted through the 'University and Department' category in Shodhganga. Data collection was conducted between 10 August 2025 to 11 September 2025. For each thesis, bibliographic fields were recorded in Microsoft 365 excel worksheet. The universities and their category were cross verified from University Grants Commission, All India Survey on Higher Education (AISHE) and respective university official websites to ensure accuracy and credibility.

Initially, 4400 bibliographic records of LIS doctoral theses from 166 universities were retrieved. Subsequently, the dataset underwent cleaning procedures, which included:

- Removal of duplicate entries
- Standardization of university names and state identifiers
- Elimination of incorrectly indexed non-LIS theses
- Verification and correction of incomplete metadata

After cleaning, the final dataset comprised 4027 LIS doctoral theses from 156 universities, which formed the basis for analysis. Descriptive and comparative statistical techniques, including frequency distribution, cross-tabulation and annual trend analysis were employed to analyze the metadata.

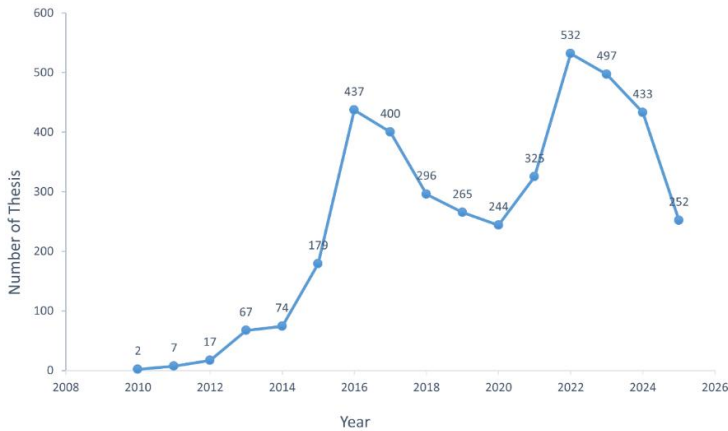
Findings

Annual Distribution of LIS Doctoral Theses (2010–2025)

Fig. 1 represents the year-wise distribution of LIS doctoral theses uploaded in Shodhganga from 2010 to 2025. The chart indicates growth of LIS doctoral research over time, though the growth is not uniform across the years. During the initial years from 2010 to 2012, the number of uploaded theses remained extremely low, ranging from only 2 theses in 2010 to 17 in 2012. From 2013 onwards, a gradual rise is observed, followed by a sharp surge between 2015 and 2016, where the number of theses increases from 179 to 437. This period marks the significant expansion in doctoral thesis deposition.

Moderate fluctuations have been observed since 2017 but the annual productivity stabilizes at relatively higher levels. A sharp peak occurs in 2022 with 532 theses, representing the highest annual output of the study period. The marginal decline observed in 2023-2025 likely reflects incomplete reporting for the recent years.

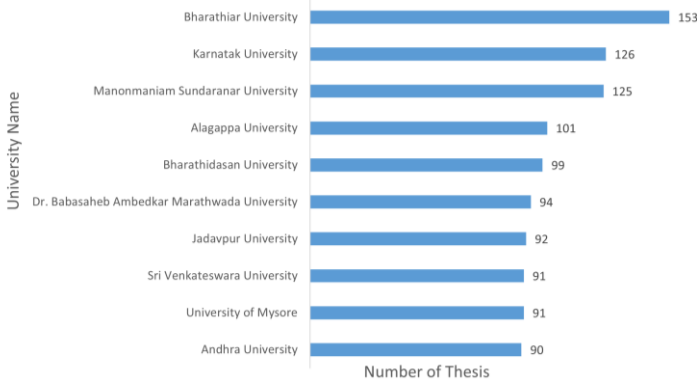
Fig. 1. Annual Growth of LIS Doctoral Theses uploaded on Shodhganga



Leading Universities Contributing to LIS Doctoral Theses

Fig. 2 shows the top ten universities contributing LIS doctoral theses in Shodhganga. A total of 156 universities has contributed theses to Shodhganga. The findings indicate that Bharathiar University ranks first with 153 theses uploads, followed by Karnatak University with 126 and Manonmaniam Sundaranar University with 125 theses. Other top contributors include Alagappa University (101) and Bharathidasan University (99). A noticeable pattern is observed that all the top ten contributing institutions are state universities.

Fig. 2. Top Universities doctoral contribution in Shodhganga



A highly uneven pattern of doctoral research upload on Shodhganga is seen across institutions as evident in Table 1. Only one university has produced more than 150 theses, while three universities fall within the 100-150 range. A limited number of 7 universities produced between 90-99 theses. Fewer institutions appear in the higher output categories, with a total of 24 universities uploaded between 50 to 150+ thesis. A majority of universities fall within the lower productivity range, particularly 44 universities producing only 1-4 theses, followed by 19 universities in the 5-9 range and 29 universities in the 10-19 range. A total of 132 universities produced between 1 to 49 theses.

Table 1. Distribution of Universities by LIS doctoral output

Thesis Range	Number of Universities	Thesis Range	Number of Universities
150+	1	40-49	12
100-150	3	30-39	11
90-99	7	20-29	17
80-89	3	10-19	29
70-79	2	5-9	19
60-69	3	1-4	44
50-59	5		

Geographical Distribution and Regional Patterns of LIS Doctoral Theses

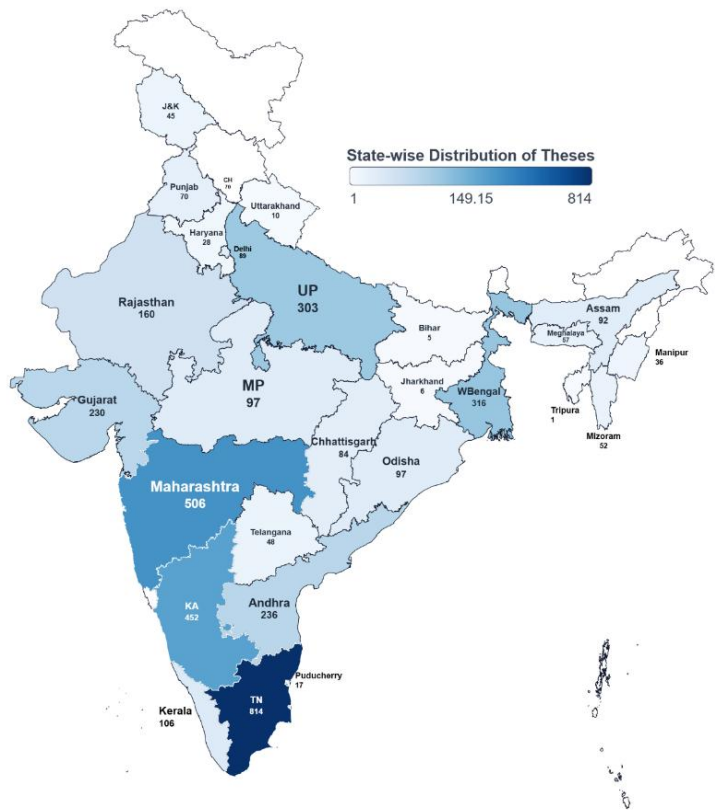
Table 2 and Fig. 3 show the geographical distribution of LIS doctoral theses across Indian states and Union territories. Tamil Nadu emerges as the most productive state with 814 theses contributed by 20 universities, indicating both high and broad institutional participation. It is followed by Maharashtra (506 theses from 16 universities) and Karnataka (452 theses from 12 universities). Other significant contributors include West Bengal (316 theses from 7 universities), Uttar Pradesh (303 theses from 12 universities) and Gujarat (230 theses from 18 universities). States such as Kerala (106 theses from only 3 universities) and Assam (92 theses from 2 universities) indicate that doctoral research is concentrated within a limited number of institutions. Regions such as Puducherry (17 theses from 1 university), Uttarakhand (10 from 2 universities), Jharkhand (6 from 2 universities), Bihar (5 from 1 university) and Tripura (1 from 1 university) show minimal doctoral upload of thesis.

Fig. 3 reveals that several southern and western states maintain stronger research ecosystems, while many northern and central states exhibit comparatively lower research uploads and institutional involvement. Similarly, the northeastern region reflects emerging yet comparatively limited LIS doctoral research activity.

Table 2. State-wise distribution of LIS Thesis

State and UTs	Number of Thesis	No. of contributing universities
Tamil Nadu	814	20
Maharashtra	506	16
Karnataka	452	12
West Bengal	316	7
Uttar Pradesh	303	12
Andhra Pradesh	236	6
Gujarat	230	18
Rajasthan	160	16
Kerala	106	3
Madhya Pradesh	97	9

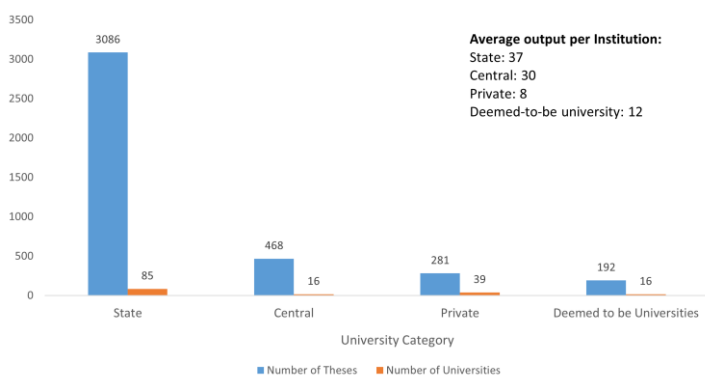
Fig. 3. Geospatial mapping of LIS Thesis



Contribution of LIS Doctoral Research by Different Categories of Universities

Fig. 4 categorizes the LIS doctoral theses across university types and reveals a clear dominance of state universities in doctoral research production. State universities account for more than 3/4th (3086 theses) of the total number of LIS doctoral theses uploaded on Shodhganga by 85 institutions, followed by Central universities' contribution of 468 theses (11.62%) from 16 institutions. Private universities, despite having 39 institutions, contribute only 281 theses (6.98%), indicating least average output per institution of 8. Similarly, deemed-to-be universities produce 192 theses (4.77%) from 16 institutions, which is the smallest share of LIS doctoral output.

Fig. 4. Contribution by different University Categories



Leading Central Universities

The leading top 10 Central universities in LIS doctoral research is clearly identified from Fig. 5. Aligarh Muslim University ranks first with 68 theses, followed by University of Delhi (57) and Mizoram University (52). Other significant contributors include North-Eastern Hill University (51) and Banaras Hindu University (49). A notable representation of universities from the North-Eastern region such as Mizoram University, North-Eastern Hill University, Manipur University and Assam University indicates the expansion of the institutions beyond traditional dominant metropolitan centers. The remaining institutions, including Babasaheb Bhimrao Ambedkar University (45), Manipur University (36), Indira Gandhi National Open University (32), Guru Ghasidas University (26) and Assam University (19) contribute a significant number of doctoral theses, in contrast to the doctoral theses they awarded.

Leading State Universities

Fig. 6 shows the dominant position of State universities in LIS doctoral research. Bharathiar University leads with 153 theses, followed by Karnatak University (126) and Manonmaniam Sundaranar University (125). Other major contributors include Alagappa University (101) and Bharathidasan University (99), highlighting the significant role of universities from Tamil Nadu in LIS doctoral research. The remaining significant contribution is from Dr. Babasaheb Ambedkar Marathwada University (94), Jadavpur University (92), Sri Venkateswara University (91), University of Mysore (91), and Andhra University (90).

Fig. 5. Top 10 Central Universities contribution

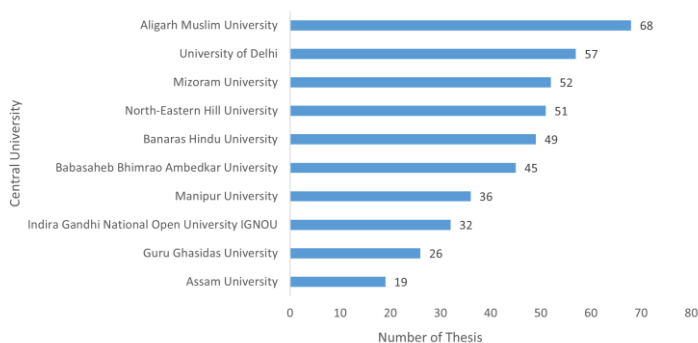
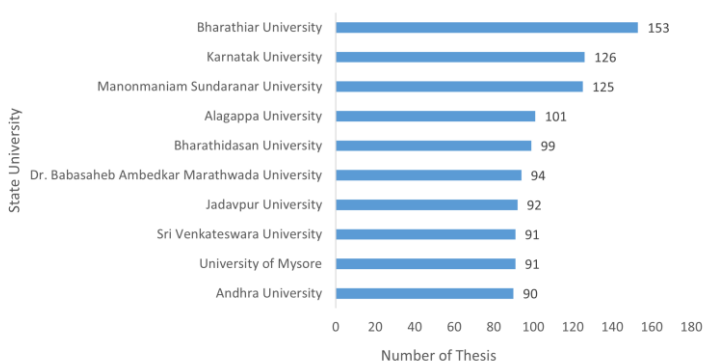


Fig. 6. Top 10 State Universities contribution

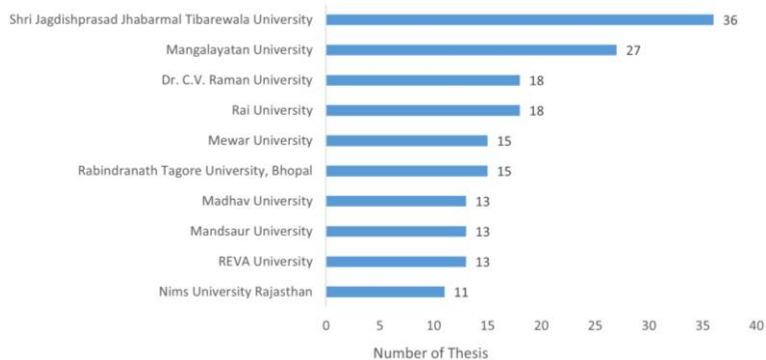


Leading Private Universities

Fig. 7 presents the leading Private Universities contributing to LIS doctoral research. Shri Jagdishprasad Jhabarmal Tibarewala University leads among the private institutions with 36 theses, followed by Mangalayatan University (27). Other universities such as Dr. C.V. Raman University and Rai University each contribute 18 theses, while Mewar University and Rabindranath Tagore

University contribute 15 theses each. The remaining institutions like Madhav University, Mandsaur University and Reva University contribute 13 theses each while Nims University contribute 11 theses, which show comparatively smaller contributions. However, the output remains relatively low compared to central and state universities.

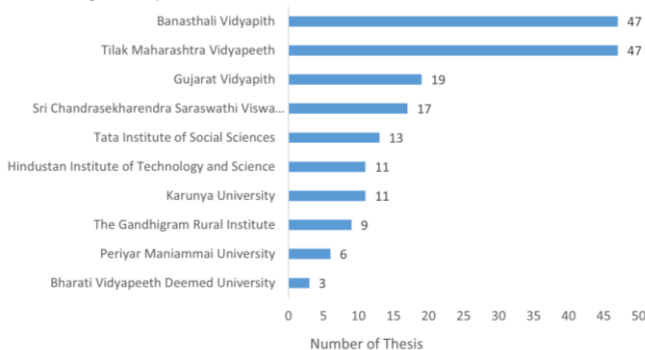
Fig. 7. Top 10 Private Universities contribution



Leading Deemed-to-be Universities

Fig. 8 highlights the contribution of deemed-to-be universities to LIS doctoral research in Shodhganga. Banasthali Vidyapith and Tilak Maharashtra Vidyapeeth jointly lead with 47 theses each. They are followed by Gujarat Vidyapith (19) and Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya (17), while TISS ranks fourth with 13 theses. Other institutions such as Hindustan Institute of Technology and Science and Karunya University have produced 11 theses each, whereas The Gandhigram Rural Institute (9), Periyar Maniammai University (6) and Bharati Vidyapeeth University (3) contribute comparatively lower. The LIS doctoral research by deemed-to-be universities is relatively less as compared to other university categories.

Fig. 8. Top 10 Deemed-to-be Universities Contribution



Discussion

By analysing the metadata of the LIS doctoral theses uploaded on Shodhganga, the present study provides insights into the current status, growth, institutional structure and geographical distribution of LIS doctoral research across Indian states and Union Territories. The temporal distribution of theses indicates a substantial expansion of LIS doctoral thesis upload during the last decade. The very low number of theses upload between 2010 and 2012 reflects the initial phase of repository adoption and incomplete archival coverage of earlier doctoral work. A sharp rise after 2015 suggests that universities increasingly complied with electronic thesis submission mandates introduced by the UGC and began depositing doctoral theses in the repository, along with improved digitization practices. Similar observations have been reported by (Esh & Ghosh, 2021), who determined that institutional compliance and digitization initiatives significantly contributed to increased thesis submissions in Shodhganga, particularly among Northeastern Universities. The peak observed in 2022 reflects the growing scale of doctoral completions in LIS, while the slight decline in recent years is influenced by incomplete repository reporting. The temporal trend indicates a substantial growth in LIS doctoral research over the past decade, which aligns with the findings of (Dora et al., 2024; Khan & Tariq, 2021).

Institutional distribution reveals a highly uneven pattern of doctoral research uploads across universities. A strong representation of universities from Tamil Nadu among the leading contributors is observed. Geographically, majority of the contributing universities are located in southern India, reflecting the regional compliance towards the UGC mandates. The analysis further revealed that only 24 institutions produced between 50 and more than 150 theses each, whereas the majority of institutions (132 universities) contributed between 1 and 49 theses each. This pattern clearly shows that LIS doctoral research in India is concentrated within a limited number of established universities, while a large number of institutions contribute only marginally.

The geographical distribution of LIS doctoral theses reveals significant regional disparities in LIS doctoral research uploads across India. The top 10 states together contribute 3220 theses, accounting for 79.96% of the total doctoral output, which shows a strong geographical concentration of doctoral research in few states. Southern and western states particularly Tamil Nadu, Maharashtra and Karnataka are the major centers of doctoral research activity, reflecting the presence of multiple universities with active LIS programmes. States such as Uttar Pradesh and West Bengal also contribute significantly, indicating the role of historically established universities supporting LIS research in northern and eastern India. Several Northeastern states like Tripura and Puducherry show comparatively lower

research productivity and institutional involvement. The uneven distribution of research across regions is closely associated with the established LIS institutions and doctoral supervision infrastructure. This observation supports earlier studies by Mundhial et al., (2022) and Ghatowar and Kalita, (2023), who reported that age and maturity of LIS department significantly influence the research productivity.

The analysis of university categories signifies the dominant role of the public university system in LIS doctoral research in India. State universities contribute more than 75% of the total doctoral output, which is attributed to their large number, wider geographical distribution, and greater responsiveness to UGC regulations and repository submission mandates. Central universities contribute a smaller but significant share of doctoral theses (11.62%), with notable participation from institutions located in the northeastern region such as Mizoram University, North-Eastern Hill University and Manipur University. The private and deemed-to-be universities contribute comparatively less number of theses, despite the increasing number of higher education institutions in these categories, which aligns with the findings of Kumar (2025), who observed that publicly funded universities continue to dominate doctoral level research in India. Although LIS doctoral research in India has expanded both institutionally and geographically, it continues to be concentrated within a limited number of established public universities and specific regions.

Limitations and future directions

The present study is limited to the analysis of metadata of LIS doctoral theses available in Shodhganga and therefore reflects patterns specific to this discipline and repository. Similar metadata-driven analyses could be extended to other disciplines to understand broader doctoral research trends in India. The study also relies on a single ETD database Shodhganga and future investigations should incorporate other national or international repositories to provide a more comprehensive perspective. Future research could examine growth phase analysis, doctoral supervision patterns, gender disparity of researchers and supervisors of doctoral research. Deeper analytical approaches using metadata elements such as titles, abstract, keywords and citations could help explore research themes, citation impact, collaboration networks and the thematic evolution of LIS doctoral research. Comparative studies between Indian ETD repositories and international ETD systems may also provide valuable global research insights. Focused investigations on underrepresented regions and emerging universities may help identify barriers and opportunities. Some universities do not fully comply with UGC mandates for timely thesis submission to Shodhganga, leading to incomplete data coverage. Inclusion of such missing theses metadata may have altered the study findings.

Conclusion

This study examines the current status and growth of LIS doctoral research available in Shodhganga through a metadata-based analysis of 4027 theses submitted by 156 universities during 2010-2025. Early phase of the repository shows less number of thesis uploads but with certain fluctuations, it substantially increased overtime. This indicates growing awareness and compliance about thesis submission in the Indian national doctoral repository. However, the analysis also highlights a highly uneven distribution of doctoral research productivity across institutions and regions. Majority of state universities and southern and western regions such as Tamil Nadu, Maharashtra and Karnataka contribute a large share of LIS doctoral research output in Shodhganga. The study found that while LIS doctoral research in India has expanded considerably through Shodhganga, but it is institutionally and regionally concentrated. These findings provide evidence for the need to strengthen LIS research ecosystems in underrepresented institutions and regions to ensure a more balanced and inclusive development of LIS doctoral research in India.

Declaration on use of generative AI tools

The authors confirm that ChatGPT, an AI tool, was utilised to enhance, paraphrase, and revise sentences and paragraphs within the manuscript for improved readability and grammatical accuracy.

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Bridging the Digital Divide as a Brand Strategy: Strengthening Library Brand Equity

**Furqana Altaf
Ishret Fayaz
Farzana Gulzar**

Abstract

Digital inequalities still exist in the digital era, and these inequalities impede the fair and equal access to education, job opportunities, civic services, and health-related information. Libraries have increasingly been taking a leading role in addressing these disparities, by facilitating access to digital infrastructure, digital skill development, and the mediating support that align with community needs. In addition to the informational role, libraries are also public service institutions whose value is determined by the perception, trust, and subsequent interaction of the users. This paper offers a descriptive and analytical synthesis that reframes digital inclusion as a strategic framework for enhancing library brand equity. This study is theoretically grounded in Aaker Brand Equity Model which conceptualizes brand equity through key dimensions such as brand awareness, perceived quality, brand associations, and brand loyalty. The paper will present the impact of digital divide bridging initiatives on these dimensions in the library context based on interdisciplinary literature on the topic, including library and information science, communication studies, and branding research. The paper suggests that digital inclusion strategies help to develop enhanced perception of service quality, positive institutional association linked with social responsibility and trust, increased visibility among diverse user groups, and promote consistent, long-term term library usage behaviours. It also emphasizes managerial and policy application of digital inclusion for strengthening libraries as credible, inclusive and socially responsive institutions in an ever more digital society.

Keywords: *Digital divide; Digital inclusion; Libraries; Brand equity; Public institutions.*

Introduction

Digital inequalities remain a persistent challenge in the modern information era, limiting equitable access to education, employment opportunities, civic services, and health information (Grimes & Porter, 2024; Real, 2021). Although the concept of the digital divide has been widely discussed since the mid-1990s, disparities based on socioeconomic, educational, geographic, and demographic factors continue to shape patterns of digital access and participation (Jaeger et al., 2012; Kinney, 2010; Plumb, 2007). These inequalities became particularly visible during the COVID-19 pandemic, when the rapid shift of social, educational, and governmental services to online platforms exposed the vulnerabilities of digitally excluded populations. Lockdowns highlighted how limited connectivity restricts individuals' ability to access essential resources and services (Real, 2021). In the early 2020s, nearly 30 percent of households in the United States lacked home broadband access, with digital exclusion disproportionately

affecting low-income households, Black and Hispanic communities, and rural populations (Grimes & Porter, 2024). Similar challenges are evident globally, where developing countries and marginalized communities continue to face infrastructural constraints, affordability barriers, and limited digital literacy (Khanchandani, 2022; Lediga & Fombad, 2018; Mojapelo, 2020). Within this context, public libraries have long served as institutions promoting equitable access to information and digital resources. Since the 1990s, libraries have increasingly assumed responsibility for addressing digital inequalities by providing technological infrastructure, supporting digital skill development, and offering mediated assistance tailored to community needs (Bertot et al., 2015; Kinney, 2010; Strover, 2019). In many rural and economically disadvantaged communities, libraries remain the primary source of free public internet access (Real et al., 2014). Beyond connectivity, libraries support digital participation through services such as digital literacy training, access to e-government platforms, job search assistance, and technology-enabled learning opportunities. Many libraries also provide access to emerging technologies including 3D printers, makerspaces, and mobile hotspot lending programs (Bell & Goulding, 2023; Plumb, 2007; Woodson et al., 2020;). Their adaptability was particularly evident during the COVID-19 pandemic, when libraries expanded online services, extended Wi-Fi access beyond library premises, and distributed devices and hotspots to underserved communities (Real, 2021). However, libraries are not merely providers of information or technological services. As public service institutions, their value is strongly shaped by user perceptions, trust, and the quality of interactions with communities (Grimes & Porter, 2024; Liu & Wnuk, 2009). In an increasingly competitive information environment where search engines, digital platforms, and commercial providers compete for users' attention, libraries must clearly communicate their value and strengthen relationships with their communities (Grant, 2015). In this regard, the concept of brand equity provides a useful analytical perspective. Introduced by Aaker (1991, 1996), brand equity refers to the value generated by a brand through consumer perceptions and experiences. Aaker conceptualizes brand equity as a multidimensional construct consisting of brand awareness, perceived quality, brand associations, and brand loyalty. These dimensions collectively influence user behaviour and institutional sustainability. While brand equity has been widely examined in commercial sectors and service contexts such as higher education (Khoshtaria et al., 2020; Mourad et al., 2020; Waqas, 2022), its application to public libraries remains relatively underexplored. As public institutions, libraries must balance their traditional mission of universal access with the strategic need to communicate their relevance and value in a digital society (Grant, 2015; Rhinesmith, 2026).

Against this backdrop, this study addresses an important gap by reconceptualizing digital inclusion not only as a social equity initiative but also as a strategic mechanism for strengthening library brand equity. Drawing on Aaker's multidimensional brand equity framework (1991, 1996), the paper proposes that digital divide bridging initiatives implemented by libraries including technological infrastructure provision, digital literacy training, technology lending, and community engagement function as brand-building mechanisms that shape user perceptions and strengthen institutional positioning. Specifically, digital inclusion initiatives may enhance brand awareness by increasing the visibility of library services, improve perceived quality through reliable and accessible digital services, strengthen brand associations related to trust, social responsibility, and community engagement, and foster brand loyalty through sustained usage and advocacy. The significance of this study lies in its contribution to both academic research and professional practice. By framing digital inclusion as a brand strategy, the study provides a rationale for library administrators and policymakers to invest in digital equity initiatives beyond their immediate social benefits. This perspective positions libraries not only as institutions responding to technological change but also as proactive creators of institutional value and community trust. For researchers, the study extends brand equity theory to the relatively underexplored context of public libraries and offers a conceptual foundation for future empirical research. By integrating insights from library and information science, communication studies, and branding research, the paper contributes to a broader understanding of how public institutions can leverage their core missions to strengthen their relevance and impact in an increasingly digital society.

Research Questions and Conceptual Framework

While digital inclusion has traditionally been examined as a social equity initiative, its potential role as a strategic mechanism for strengthening institutional reputation and brand value remains underexplored. To address this gap, the present study investigates how digital inclusion initiatives influence the key dimensions of library brand equity.

The study addresses the following research questions:

- RQ1: How do digital inclusion initiatives implemented by libraries contribute to the development of overall library brand equity?
- RQ2: How do digital inclusion initiatives influence brand awareness of libraries within their communities?
- RQ3: How do digital inclusion services affect users' perceptions of service quality in libraries?
- RQ4: In what ways do digital inclusion initiatives shape brand associations related to trust, social responsibility, and technological relevance in libraries?

RQ5: How do digital inclusion initiatives contribute to the development of brand loyalty among library users?

To address these questions, this study adopts Aaker's (1991, 1996) brand equity model as the conceptual foundation. The proposed framework positions digital inclusion initiatives as strategic drivers influencing the four key dimensions of brand equity: brand awareness, perceived quality, brand associations, and brand loyalty. These dimensions collectively contribute to the development of stronger institutional brand equity for libraries. The conceptual framework guiding this study is presented in Fig. 1.

Fig. 1: Conceptual Framework



Literature Review

(a) The Digital Divide

The concept of the digital divide gained prominence in the mid-1990s through a series of reports by the National Telecommunications and Information Administration titled *"Falling Through the Net"*, which documented systematic disparities in access to computers and the Internet across socioeconomic, educational, racial, and geographic groups (Jaeger et al., 2012; Kinney, 2010; Plumb, 2007). Subsequent research has demonstrated that digital inequality is multidimensional, reflecting structural differences in access, skills, and meaningful use of digital technologies. Income remains one of the strongest predictors of digital exclusion, as lower-income households are significantly less likely to have reliable home broadband access (Grimes & Porter, 2024). Disparities also persist across racial and ethnic groups, with Black, Hispanic, and Native American populations reporting lower levels of Internet access even after controlling for income (Plumb, 2007). Geographic factors further intensify these inequalities, as rural communities frequently face infrastructural limitations and limited broadband availability (Real et al., 2014). Additional dimensions such as age, disability, and language barriers also shape individuals' ability to participate effectively in digital environments. These structural inequalities became particularly visible during the COVID-19 pandemic, when the rapid shift of education, employment, and public services to online platforms exposed the vulnerabilities of digitally excluded populations. Individuals without stable

Internet connectivity experienced significant disadvantages in accessing education, employment opportunities, health services, and civic participation (Grimes and Porter, 2024; Real, 2021).

(b) Role of Libraries in Addressing the Digital Divide

Within this context, public libraries have emerged as key institutional actors in addressing digital exclusion. Over the past two decades, libraries have significantly expanded their technological infrastructure, and nearly all public library outlets in the United States now provide free public Internet access (Kinney, 2010). In many communities, particularly rural and economically disadvantaged areas, libraries remain the primary source of free computer and Internet access (Real et al., 2014). Beyond connectivity, libraries play an important role in supporting digital participation by offering digital literacy training, technical assistance, and guidance in completing online activities such as job applications, accessing e-government services, and participating in telehealth consultations (Grimes & Porter, 2024; Plumb, 2007; Strover, 2019). Through these services, libraries function as community-based institutions that facilitate equitable access to digital resources and skills.

(c) Digital Inclusion Initiatives in Libraries

The broader concept of digital inclusion extends beyond access to technology and encompasses several interconnected components, including affordable broadband connectivity, Internet-enabled devices, digital literacy training, technical support, and applications that enable meaningful participation and self-sufficiency (Grimes & Porter, 2024; Rhinesmith, 2026). Public libraries contribute to these dimensions by offering free Wi-Fi, public access computers, hotspot lending programs, technology training sessions, and individualized technical assistance (Bell & Goulding, 2023; Bertot et al., 2015). Empirical evidence shows that users of library computer services are disproportionately drawn from digitally marginalized populations, and for many individuals the library represents their primary point of Internet connectivity (Kinney, 2010). In recent years, library-based digital inclusion initiatives have expanded beyond traditional public access computing. Mobile library services provide connectivity and digital training to remote communities (Bell & Goulding, 2023), while hotspot lending programs allow users to access the Internet from their homes, addressing affordability and infrastructure barriers (Real, 2021; Strover, 2019). During the COVID-19 pandemic, libraries further expanded these initiatives by extending Wi-Fi access beyond library premises, increasing digital collections, and providing devices and connectivity solutions to underserved populations (Real, 2021). Although rural libraries often operate under constraints such as limited staffing, restricted budgets, and inadequate broadband infrastructure, they continue to address community digital needs through partnerships, grants, and volunteer networks (Potnis &

McDonald, 2025; Real et al., 2014). Similar initiatives can also be observed internationally, where libraries in countries such as South Africa, India, and Aotearoa New Zealand contribute to digital equity despite facing infrastructural and policy challenges (Bell & Goulding, 2023; Khanchandani, 2022; Lediga & Fombad, 2018; Mojapelo, 2020).

(d) Challenges in Library-Based Digital Inclusion

Despite these efforts, challenges remain in the implementation of digital inclusion initiatives. Regulatory frameworks such as the Children's Internet Protection Act require content filtering, while time limits on public computers may constrain users attempting to complete complex online tasks. In addition, library staff often face increasing technological demands without adequate training or resources. Nevertheless, libraries remain uniquely positioned to promote digital equity because of their institutional legitimacy, strong community presence, and longstanding commitment to free and equitable access to information (Strover, 2019). Through these roles, libraries continue to function as critical intermediaries in bridging digital divides and enabling broader participation in an increasingly digital society.

(e) Brand Equity in Service and Public Sector Contexts

The marketing literature on brand equity originated in late 1980s. Aaker (1991) refers to brand equity as a set of assets such as brand awareness, loyal customers, perceived quality and brand associations that are linked with the brand and contribute value to the product or service being sold. This framework by Aaker identifies four major dimensions including brand awareness, perceived quality, brand associations as well as brand loyalty (Aaker 1991, 1996). This multidimensional conceptualization proposed by Aaker has been proven correct in different contexts by research. Gill and Dawra (2010) empirically studied the sources of brand equity provided by Aaker, and established that brand awareness and brand image are independent variables with brand image being an intermediate between brand awareness and the overall brand equity.

Brand equity plays a special role in services specifically because of their intangible nature and the impact of customer experience in creating perceptions. Higher education studies have applied brand equity frameworks to nonprofit and public institutions, which has shown that brand awareness, perceived quality, and brand association have a role in student choice, satisfaction, and loyalty (Khoshtaria et al., 2020; Mourad et al., 2020; Waqas, 2022). Research demonstrates that reputation of the institution, faculty qualification, campus infrastructure, and student services serve as brand building processes that influence stakeholder perceptions and behavioural responses, including enrollment, donations by alumni, and positive word of mouth. Ahmmed et al. (2025) also show that academic programs and campus facilities play a very crucial role in institutional brand image and student satisfaction.

Goi et al. (2014) found that visual identity (facilities, staff, systems) and verbal identity (promotion, public relations) were the principal brand dimensions in the higher education sector, where the private institutions developed a stronger identity by means of deliberate marketing. The same case applies to the libraries where both dimensions need to be managed coherently. In higher education, Chen and Hiew (2025) discovered eight dimensions of online brand equity such as institutional reputation, e-campus performance, and competence of the faculty. Presence on the internet and quality of digital services are becoming more influential in how the brand is perceived, and this applies to digital service delivery by libraries.

(f) Libraries and Brand Equity

Despite a vast body of literature on brand equity in both commercial and educational setting, there is limited application of brand equity to a public library setting. Grant (2015) believes that libraries should redefine their brand by moving past the conventional perception of being repositories for books, a narrow view which persists in the minds of the people despite the broader role of libraries. According to the reports offered by OCLC, three-quarters of Americans identify books as the first thing that comes to mind when thinking about libraries, and this image has been reinforced over the years (Grant, 2015). This brand identity restricts the capacity of libraries to articulate their modern value proposition, especially their value in digital inclusion, lifelong learning, and community involvement. Research on internal branding in universities provides valuable insights that can be applied in libraries. Judson et al. (2006), show that clear communication of the brand values to the employees leads to a better understanding and implementation of the brand promise. Duh and Wara (2024) discover that the information generation and dissemination to employees have a positive effect on role clarity, brand knowledge, and brand commitment, which subsequently leads to brand citizenship behaviour and positive word-of-mouth. This indicates that the digital inclusion effort in libraries can enhance the organizational commitment and organizational identity provided these initiatives are well communicated both internally and externally. Although libraries have undergone a progressive enhancement in their technological infrastructure, Buono and Fortezza (2017) emphasize that the establishment of a modern brand image needs to be addressed by strategic design management. They state that the visual identity and the concept of integrated communications is the key for creating an experience that transcends traditional institutional boundaries. Despite these developments, existing research has not systematically examined how libraries' digital divide bridging initiatives contribute to the formation of brand equity. This gap in the literature highlights the need to explore how digital inclusion initiatives undertaken by libraries influence the development of institutional brand equity. To address this gap, the present study adopts Aaker's brand equity

model as the conceptual framework for analyzing the relationship between digital inclusion initiatives and library brand equity.

(g) Aaker's Brand Equity Model

Brand equity is one of the most powerful marketing concepts conceptualized by Aaker (1991, 1996). According to Aaker (1991), brand equity is defined as a set of assets such as brand awareness, perceived quality, brand associations and loyal customers that are associated with the brand and enhance value to the product or service being offered. This conceptualization is multidimensional, and brand equity is viewed as a composite construct with four major dimensions, namely: brand awareness, perceived quality, brand associations, and brand loyalty (Aaker 1991, 1996).

Brand awareness: This concept refers to the strength of the brand presence in the mind of the consumer encompassing both brand recognition and brand recall. The brand awareness in the library setting takes the form of community knowledge about library services, recognition of library branding and communications, and the extent to which libraries are top-of-mind when information is required (Grant, 2015). A greater level of awareness leads to an increased library usage and reduces the perceived risk of using new services (Mourad et al., 2020).

Perceived quality: This concept refers to the perception consumers have about the brand's overall excellence or superiority (Aaker, 1991). It is different from objective quality; it is the subjective assessment, which is based on consumer experiences, expectations, and information available (Aaker, 1996). In case of libraries, perceived quality involves judgement about service reliability, expertise of the staff, resource relevance, facility adequacy and technological competence (Khoshtaria et al., 2020). Users who feel that they have received high-quality services in the library have a higher chance of revisiting the library and referring others to the library.

Brand associations: This concept refer to "anything linked in memory to a brand" (Aaker, 1991). Which include product attributes, customer benefits, usage situation, organizational association, and brand personality. Brand associations create meaning and differentiation, which give consumers a reason to choose one brand over other. Strong, favourable and unique associations contribute positively to brand equity (Gill & Dawra, 2010). Libraries are associated with the ideas of trust, community, learning, free access, and social responsibility (Grimes & Porter, 2024; Rhinesmith, 2026). Digital inclusion programs have the potential to create the associations of innovation, relevancy, and social equity that might rebrand the conventional understanding of libraries as book-based institutions, which remain focused on books (Grant, 2015).

In addition, organizations can also enhance their brand by utilizing the secondary brand associations, effectively linking their brand with positive attributes like people, locations, and contemporary cultural elements, etc.

(Juusola et al., 2023). Through digital inclusion efforts libraries can create the secondary associations with innovation and social responsibility by collaborating with technology providers and positioning within smart city contexts. Two key concepts in branding are visual identity and verbal identity; Visual identity is anything that is tangible such as facilities and technology infrastructure, while verbal identity involves communication through promotion and word of mouth. Libraries digital inclusion work contributes to both: visible technology strengthens the visual identity, whereas community narratives shape verbal identity (Goi et al., 2014). Online brand equity depends on e-campus performance (use of web sites, availability of information), and e-campus information (forums and rankings online) (Chen & Hiew, 2025). Libraries should make sure their digital platforms effectively communicate and demonstrate impact so that remote users will also be able to access their services. Brand experience appeals to the users from both cognitive and affective dimensions and creates a memorable experience and attachment (Buono & Fortezza, 2017). The digital inclusion programs in libraries, which are perceived as supportive and empowering, create experiential value, which enhances the attachment of users to the institution.

Brand loyalty: It represents “the attachment that a customer has to a brand” (Aaker, 1991). It occurs in the form of repeated customers, unwillingness to change, and word of mouth (Aaker, 1996). Brand loyalty in libraries manifests itself in the form of continued use over time, engagement in programs and events, promotion in social networks, and intergenerational transmission of library behaviour (Waqas, 2022). Studies indicate that good experiences in the university result in a long-term loyalty in terms of donations, recommendations and continued participation. The applicability of this model by Aaker to the public institutions is supported by research in higher education context. Research indicates that brand recognition, quality perceptions, associations, and loyalty influence student choice, satisfaction, alumni giving, and reputation of the institution (Khoshtaria et al., 2020; Mourad et al., 2020). Waqas (2022) discovered that brand experience leads to student engagement that consequently increases brand equity. Carvalho et al. (2021) established that eWOM affects the university brand equity, and positive eWOM reinforces brand images. Ahmmed et al. (2025) also confirm that the relationship between the dimensions of service quality and student satisfaction is mediated by institutional brand image. These results indicate that the framework proposed by Aaker can be productively applied to libraries which share with universities such features as service intensity, long-term relationships with users and community embeddedness.

For this paper, Aaker’s four-dimensional model provides the theoretical lens through which libraries’ digital inclusion initiatives are examined. Each

dimension offers a distinct pathway through which digital divide bridging efforts may contribute to brand equity formation.

Digital Inclusion as Brand Strategy

Brand Awareness

Brand awareness is the level of brand presence in the mind of the consumer encompassing recognition and recall (Aaker, 1991). The digital inclusion programs in libraries create awareness, which directly builds brand awareness. Through the expansion of Wi-Fi ranges, lending hotspots, or deploy mobile library services, libraries achieve greater visibility in new places and contexts (Bell & Goulding, 2023; Real, 2021). Users who were previously disengaged from the library may now connect with its services through digital access points located in their neighbourhood, schools and community canterers. Studies show that computers and internet services that can be accessed publicly is one of the ways of drawing new users to libraries. Research on Gates Foundation grants discovered that libraries participating in public access computing initiatives witnessed an average growth of 36 percent in user traffic, and many users reported computers were the primary reason for their visit to the library. The swift adaptation of libraries to online programming and digital collections during the COVID-19 pandemic attracted a lot of media attention and community awareness, demonstrating institutional agility and the desire to provide continued service (Real, 2021).

Perceived Quality

Perceived quality refers to the consumers judgement about the overall quality or excellence of a brand (Aaker, 1991). Perceived quality in libraries encompasses judgement about service reliability, expertise of staff members, technology functionality, and relevance of resources (Khoshtaria et al., 2020). Digital inclusion initiatives shape perceived quality in a variety of ways. Reliable internet access, well serviced public access computers, and functional hotspot lending services are the indicators of competence on the institutional level, as well as service excellence (Bertot et al., 2015; Strover, 2019). Users find such a library valuable when they successfully complete job applications, access e-government services, or participate in telehealth appointments with the help of library-provided technologies (Grimes & Porter, 2024; Plumb, 2007). Employee assistance is an important aspect of perceived quality in digital service delivery. The user's perception about service quality and institutional care is enhanced when librarians provide patient, knowledgeable technology support (Liu & Wnuk, 2009; Potnis & McDonald, 2025). Studies indicate that two-thirds of computer users in the library seek staff assistance, and those who are assisted report greater satisfaction and increased confidence in technology use. Digital infrastructure quality is also important; libraries with sufficient bandwidth, adequate workstations, and up to date software indicate that the institution

invests in the user experience (Real et al., 2014). On the other hand, slow networks, malfunctioning devices, and restricted time of access have an adverse effect on perceived quality (Kinney, 2010; Lediga & Fombad, 2018).

Brand Associations

Anything that is linked in the memory with a brand is referred to as brand associations and these include attributes, benefits, attitudes, and organizational associations (Aaker, 1991). The digital inclusion efforts of libraries create powerful associations with social responsibility, equity, trust, and commitment to the community. By providing free internet access and technological training to disadvantaged groups, libraries reflect values of inclusion and equal opportunity (Grimes & Porter, 2024; Rhinesmith, 2026). These associations make libraries differentiate themselves from commercial internet providers and other access points available to the public, which positions them as trusted community institutions rather than market actors (Strover, 2019). Studies in the field of higher education demonstrates that institutional associations with quality, care, and social responsibility influence the perception of stakeholders and their behavioural intentions (Ahmmed et al., 2025). Libraries can enhance brand associations by leveraging secondary associations through collaboration with technology companies and government agencies (Juusola et al., 2023). In digital inclusion contexts, trust is found to be a significant association. Research has shown that users trust libraries with sensitive online activities like job applications, enrolling benefits and personal communication because libraries are considered to be neutral, private, and reliable places (Plumb, 2007; Real et al., 2015). This trust extends to technology and staff support provided in libraries, with users expressing confidence in the accuracy and privacy of the support they receive (Liu & Wnuk, 2009; Potnis & McDonald, 2025). Digital inclusion initiatives also create associations with innovation and relevance. Libraries that provide access to emerging technologies like 3D printers, makerspaces, or virtual reality equipment, are positioned as forward-thinking institutions that respond to community needs (Grant, 2015; Woodson et al., 2020). These associations challenge traditional perception of libraries highlighting their institutional evolution and vitality.

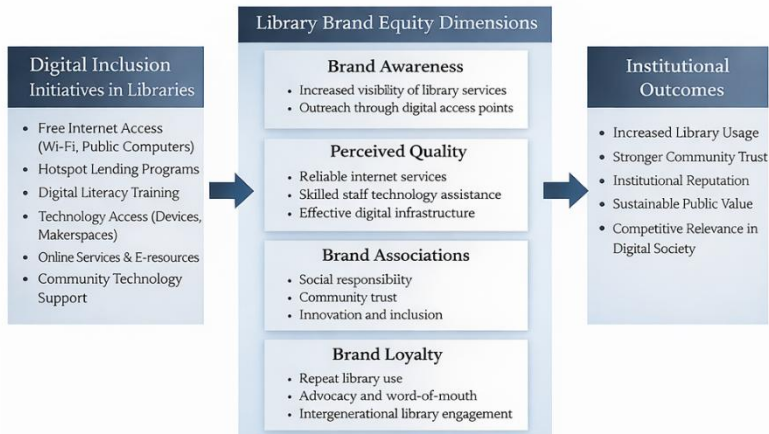
Brand Loyalty

Brand loyalty represents the attachment a customer has to a brand, reflected in repeat purchases, low switching tendency and positive word of mouth (Aaker, 1991). Digital inclusion initiatives contribute to library loyalty in various ways. Users who address critical needs through library technology like finding jobs, completing education, receiving medical care, and connecting with family members, etc., establish strong affective relationships with the institution (Grimes & Porter, 2024). Positive experiences create emotional attachment that goes beyond transactional services use, encouraging users to acknowledge the library as an important

part of their life (Waqas, 2022). Word-of-mouth advocacy represents one of the prime manifestations of brand loyalty. Research has proven that users who are satisfied with library technologies recommend library services to family members, friends, and other community members (Carvalho et al., 2021; Kinney, 2010). Digital inclusion work also results in intergenerational loyalty. Parents who use library computers to support their children with homework or those who attend family technology programs transmit library usage practices to the next generation. Multigenerational relationships are especially useful in rural libraries, where employees tend to work with several generations of families, developing deep connections with the community (Potnis & McDonald, 2025). The relationship between digital inclusion and brand loyalty is a two-way process that takes place both in terms of cognitive and affective mechanisms. Users have a cognitive understanding of the instrumental value of library technology services and continue using them depending on the perceived utility. Emotionally, positive experiences, gratitude for free access and identification with the values of the library creates emotional attachments that keep loyalty alive even when alternative access options are available. With proper communication of their digital equity work and engage users as partners in inclusion efforts, libraries can strengthen these emotional connections and turn technology users into library advocates and ambassadors.

Taken together, the preceding discussion illustrates how digital inclusion initiatives function as strategic mechanisms for strengthening the brand equity of public libraries. As illustrated in Fig. 2, initiatives such as free internet access, hotspot lending programs, digital literacy training, and technology-enabled services enhance brand awareness by increasing the visibility of library services within communities. These initiatives also strengthen perceived quality by demonstrating service reliability, technological competence, and staff support. At the same time, they foster positive brand associations related to trust, social responsibility, and technological relevance, positioning libraries as inclusive and community-oriented institutions. Ultimately, positive user experiences generated through digital inclusion initiatives contribute to brand loyalty, reflected in sustained library usage, community advocacy, and intergenerational engagement. By reinforcing these interconnected dimensions, digital inclusion initiatives not only address digital inequalities but also enhance the overall institutional value and reputation of libraries in an increasingly digital society.

Fig. 2. Conceptual framework linking digital inclusion initiatives and library brand equity. Adapted from Aaker (1991, 1996).



Discussion

This paper has argued that the digital divide bridging initiatives by libraries are brand-building mechanisms that increase the institutional awareness, perceived quality, associations and loyalty. It reframes digital inclusion not merely as a social service but as a strategic investment in institutional value and community relationships. A number of implications can be drawn out of this analysis. First, libraries need to identify and communicate the brand dimensions of their digital equity work. By expanding Wi-Fi coverage, loan hotspots, or offering technological training, libraries create visibility, demonstrate quality, build trust and create conditions that lead to loyalty. These results should be measured, celebrated, and embedded in institutional discourse on library value. Grant (2015) argues that libraries must redefine their brand beyond books, and digital inclusion offers a solid foundation for this rebranding, framing libraries as crucial community infrastructure for digital participation. Second, the framework indicates that the digital inclusion initiatives may generate brand returns, which extends beyond the direct impact of services. Users who successfully access employment, education, or healthcare services through library technology develop positive associations and loyalty that can be generalized to other library services. This is a spillover effect, which means that investment in digital infrastructure and training has compound benefits on the institutional portfolio. Libraries that serve disadvantaged communities can potentially achieve substantial brand value, as their digital equity efforts embodies core values of inclusiveness and social responsibility (Grimes & Porter, 2024; Rhinesmith, 2026). Third, the analysis also highlights importance of staff in mediating brand outcomes. Technology support provided by librarians

determines the perceived quality, and their interactions with the users create trust and attachment. This is a clear indication that the investments in staff training, adequate staffing level, and supportive working environment are not only necessary in service delivery but also in building brand equity (Potnis & McDonald, 2025). Libraries that face resource constraints may need to prioritize staffing alongside technology investment in order to achieve brand benefits. Fourth, the framework has significant implications for library advocacy and funding. The framing of digital inclusion as brand strategy offers a strong justification for investment that appeals to stakeholders who are concerned about institutional relevance and community impact. Libraries do not need to be positioned as cost centers that need to be subsidized but as value-making institutions whose digital equity activities can generate a measurable brand equity (Strover, 2019). Such reframing can empower libraries in their budgetary negotiations and community planning processes.

Limitations

While this study offers a conceptual framework linking digital inclusion initiatives with library brand equity, it is primarily based on the synthesis of interdisciplinary literature rather than empirical data. As such, the relationships proposed between digital inclusion efforts and the dimensions of brand equity should be viewed as theoretically grounded propositions that warrant further empirical validation. Future research may employ quantitative surveys, qualitative interviews, or case studies to examine how users perceive libraries' digital inclusion initiatives and how these perceptions influence institutional brand outcomes. The interdisciplinary synthesis is based on library and information science, communication studies and branding research literature. Although this approach enables theoretical integration, it also introduces issues of construct equivalence and context applicability. Additionally, the framework draws upon Aaker's brand equity model, which was originally developed in commercial marketing contexts. Although this model has been widely applied in service and nonprofit settings, its application to public libraries may benefit from further contextual refinement to capture the distinctive characteristics of library services and community engagement (Grant, 2015; Rhinesmith, 2026). Finally, variations in institutional resources, community contexts, and policy environments may influence how digital inclusion initiatives shape brand perceptions across different library systems. Future studies can explore these contextual factors to further strengthen and refine the proposed framework.

Future Research Directions

The proposed relationships between the library brand equity dimensions and digital inclusion initiatives need to be tested through empirical research. Building on the conceptual framework presented in this study, future quantitative research could adapt existing brand equity measurement scales to the library context in order to assess user perceptions of brand awareness, perceived quality, brand associations, and brand loyalty in relation to digital services. Such studies may explore whether users who actively engage with library technology services exhibit different brand perceptions compared to those who do not use these services, and whether the intensity of service usage is associated with stronger brand outcomes. At the same time, complementary qualitative research could provide deeper insights into how users interpret libraries' digital inclusion initiatives and how these experiences shape the narratives and associations that contribute to institutional trust and attachment (Waqas, 2022). In addition to user-level perceptions, future research could also examine how contextual factors influence the brand impacts of digital inclusion initiatives. Comparative studies among library types, geographic contexts, and community characteristics would highlight contextual factors influencing the brand impacts of digital inclusion. Research might compare brand outcomes in rural and urban libraries, in communities with different levels of broadband access, or among institutions with different resources bases and service models (Real et al., 2014). Furthermore, longitudinal research would allow scholars to track how user perceptions evolve over time as libraries adopt new digital initiatives, thereby capturing the dynamic processes through which brand equity gradually develops. Finally, examining the mediating role of library staff in shaping user experiences could extend insights from internal branding research to the library sector, highlighting how staff interactions contribute to the development of institutional brand performance (Duh & Wara, 2024; Judson et al., 2006).

Conclusion

Digital inequalities persist even after decades of policy attention and institutional effort, preventing millions from full participation in education, employment, health care, and civic life. Public libraries have emerged as main institutional players addressing these disparities, by offering free internet access, technology training and digital inclusion services to the communities across the nation. This paper argues that digital divide bridging initiatives by libraries are not only social service interventions, but also strategic brand building processes that enhance institutional awareness, quality perceptions, associations, and loyalty. The paper has systematically analysed how digital inclusion influences each brand dimensions by relying on the multidimensional brand equity model proposed by Aaker (1991,

1996). Digital initiatives create visibility that builds brand awareness; demonstrates quality through accessible services that form perceived quality; create positive associations with social responsibility, trust, and innovation; and foster loyalty through meaningful user experiences and community connections. The framework places libraries not as passive responders to technological change, but as proactive creators of institutional value whose digital equity efforts generate cumulative benefits across service domains. To library administrators, the reframing provides a strong reason why it is worth investing in digital inclusion beyond its social utility. For researchers, it applies brand equity theory into the underexplored context of public libraries, offering a conceptual foundation for empirical investigation. For communities, it validates the essential role of libraries in ensuring that every member of the community can participate fully in an increasingly digital society. With the ongoing technological advancements and increasing digital demands, the digital inclusion work of libraries will only grow in significance. By recognizing and leveraging on its brand dimensions, libraries will be able to remain credible, inclusive, and socially responsive institutions for generations to come.

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Bibliographic Note

This study adopts a descriptive and analytical approach based on a systematic review of interdisciplinary literature drawn from library and information science, communication studies, and branding research. The paper relies exclusively on secondary sources, including peer-reviewed journal articles, academic books, and policy reports, to synthesize existing knowledge on the digital divide, digital inclusion initiatives, and brand equity. The literature was identified through major academic databases such as Scopus, Web of Science, and Google Scholar using keywords including “digital divide,” “digital inclusion,” “public libraries,” “brand equity,” and “Aaker brand model.” Priority was given to peer-reviewed and high-impact publications, with an emphasis on both foundational works and recent studies to ensure theoretical depth and contemporary relevance. Sources were selected based on their relevance to the research objectives, conceptual rigor, and contribution to understanding the intersection of digital inclusion and institutional branding.

The theoretical foundation of the study is anchored in Aaker’s Brand Equity Model (1991, 1996), which serves as the primary analytical lens for examining how digital inclusion initiatives influence brand awareness, perceived quality, brand associations, and brand loyalty in public libraries. A conceptual synthesis approach is adopted as it allows for the integration of diverse theoretical perspectives and the development of a coherent framework in an underexplored research area where empirical evidence remains fragmented. While this approach enables broad theoretical integration, certain limitations must be acknowledged. The study is dependent on existing literature, which may reflect publication bias and uneven geographic representation, with a concentration of studies from developed contexts. Additionally, the application of a model originally developed for commercial settings may require further contextual refinement for public institutions such as libraries.

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Libraries as Civic-Epistemic Institutions Shaping Digital and Global Citizenship

M. P. Singh
Shivangi Shukla
Komal Gupta

Abstract

The rapid digitization of contemporary society has transformed civic participation, knowledge production, and global interconnectedness, situating citizenship within algorithmically mediated digital environments. In this context, libraries must be reconceptualized not merely as information service providers but as civic-epistemic institutions that sustain democratic participation while safeguarding the integrity of knowledge. Drawing on scholarship in information literacy, digital citizenship, algorithmic literacy, artificial intelligence ethics, and global citizenship education, this conceptual study proposes an integrated framework linking digital literacy, digital citizenship, and global citizenship as interconnected dimensions of contemporary civic development. It argues that through equitable access, critical literacy pedagogy, ethical engagement with emerging technologies, and facilitation of intercultural dialogue, libraries shape the structural conditions under which informed, responsible, and globally aware citizenship emerges. By bridging technical competence with ethical reflection and global responsibility, libraries play a foundational role in cultivating reflective digital participants and globally engaged citizens within the networked knowledge society.

Keywords: Digital literacy; Digital Citizenship; Global Citizenship; Civic-Epistemic; Libraries

Introduction

Higher education and civic life today operate within environments shaped by rapid technological change and deepening global interconnectedness. Digital systems, including institutional repositories, learning platforms, social media networks, and artificial intelligence tools, now influence how people locate information, communicate ideas, and engage in public discourse. Information now circulates rapidly and is often organized and filtered by algorithmic systems that determine what is visible, prioritized, or recommended. Although this transformation has broadened access to knowledge, it has also introduced new concerns, including misinformation, algorithmic bias, privacy risks, and limited transparency in how digital platforms operate (Pasquale, 2015).

Students and citizens commonly depend on search engines and social platforms as primary sources of information. However, research suggests that many users do not critically examine how ranking systems and personalization features shape what appears authoritative or credible (Head et al., 2020). As a result, the educational challenge extends beyond teaching search skills. It now involves helping individuals understand how digital

systems structure knowledge, how online participation carries ethical implications, and how technological mediation influences public dialogue. Libraries have long been guided by principles of intellectual freedom, equitable access, and support for informed communities within democratic knowledge systems. In the current context, these principles take on renewed significance. Addressing contemporary digital challenges requires libraries to move beyond traditional service models and engage more actively in fostering critical awareness and responsible participation. Recent scholarship highlights their growing involvement in areas such as algorithmic literacy, artificial intelligence education, and institutional technology governance (Ridley & Pawlick-Potts, 2021). This evolving role positions libraries not only as information providers but also as contributors to the development of thoughtful and engaged digital citizens.

This paper first reviews relevant scholarship, then examines the convergence of digital and global citizenship, followed by an analysis of libraries as civic-epistemic institutions, before discussing institutional implications. This study advances existing scholarship by framing libraries not merely as instructional actors but as civic-epistemic institutions that structurally mediate knowledge integrity and democratic participation in digitally networked societies. This study contributes by developing an integrated conceptual framework that positions libraries as civic-epistemic institutions linking digital literacy, digital citizenship, and global citizenship.

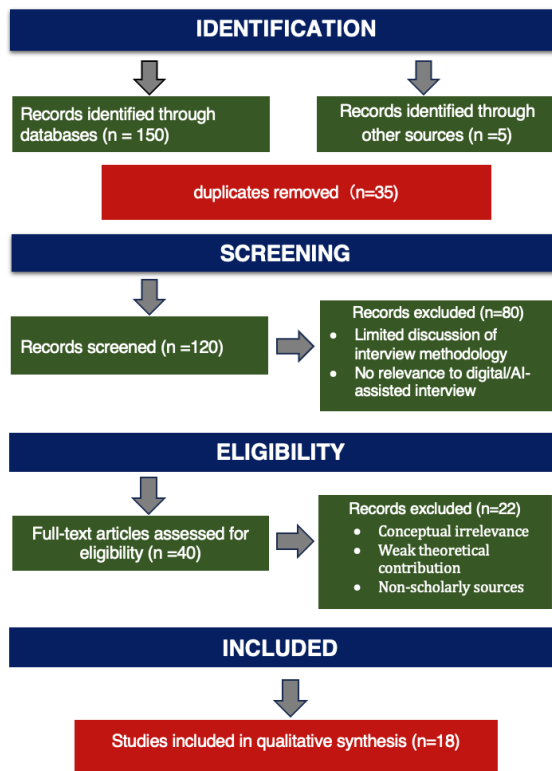
Methodology

This study adopts a conceptual and integrative review approach to examine the role of libraries in shaping digital and global citizenship within digitally mediated knowledge environments. To ensure methodological rigour and transparency, the review process was guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. A systematic literature search was conducted across major academic databases, including Scopus, Web of Science, and Google Scholar, using keywords such as digital literacy, digital citizenship, global citizenship, algorithmic literacy, and academic libraries. The search was limited to publications between 2011 and 2024 to capture recent developments in the field.

The study selection process followed four stages: identification, screening, eligibility, and inclusion, as illustrated in Fig. 1. A total of 155 records were identified (150 from databases and 5 from additional sources). After removing 35 duplicates, 120 records were screened based on titles and abstracts. Of these, 80 studies were excluded due to lack of relevance or insufficient conceptual contribution. The remaining 40 full-text articles were assessed for eligibility, leading to the exclusion of 22 studies due to

conceptual irrelevance, weak theoretical grounding, or non-scholarly nature. Ultimately, 18 studies were included in the final qualitative synthesis. Inclusion criteria required studies to be peer-reviewed, conceptually relevant, and directly related to digital literacy, digital citizenship, global citizenship, or algorithmic literacy within library and information science contexts. Exclusion criteria included non-scholarly sources, studies lacking theoretical depth, and works not aligned with the core themes of the study. The selected literature was analyzed using a thematic synthesis approach, identifying key domains such as digital literacy, algorithmic literacy, digital citizenship, and global citizenship. These themes were further integrated to develop a conceptual framework positioning libraries as civic-epistemic mediators of knowledge, technology, and citizenship. While the PRISMA-informed process enhances transparency and systematic selection, the study remains conceptual in nature and does not include empirical validation.

Fig. 1: Flow diagram of study selection process



Literature Review

Scholarly discourse on libraries and citizenship formation has progressively evolved from foundational models of digital responsibility to more complex frameworks that incorporate algorithmic awareness, ethical reasoning, and global civic engagement. This shift reflects the growing recognition of libraries as active agents in navigating the sociotechnical dimensions of the digital age.

Recent studies emphasize the importance of algorithmic literacy as a critical extension of information literacy. Users' "folk theories" of algorithms shape their perceptions of digital systems, and these pre-existing understandings can be leveraged to cultivate deeper critical awareness of algorithmic infrastructures within library instruction (Ridley, 2024). Algorithmic literacy is increasingly recognized as an emerging domain within library education, with libraries playing a crucial role in explaining the sociotechnical mechanisms underlying search engines, recommendation systems, and data analytics (Ridley & Pawlick-Potts, 2021). This expanded role enables libraries to move beyond access provision toward fostering critical engagement with digital environments.

The ethical implications of digital technologies, particularly artificial intelligence, further extend the responsibilities of libraries. Libraries are seen as key institutions for promoting transparency, accountability, and public understanding of AI systems (International Federation of Library Associations and Institutions, 2021). Similarly, ethical frameworks grounded in human rights principles emphasize the importance of aligning digital citizenship with broader concerns of governance and social responsibility (UNESCO, 2021).

Empirical research highlights gaps in users' understanding of algorithmically mediated information systems. Students often rely heavily on search engines while lacking awareness of ranking mechanisms and visibility structures, underscoring the need for integrating algorithmic literacy into library instruction (Head et al., 2020). The opacity of algorithmic systems, often described as "black boxes," further reinforces the need for critical awareness of technological power structures (Pasquale, 2015).

The transformation of academic libraries is evident in their expanding functional roles. Libraries are increasingly contributing to research data management, digital scholarship, and open science, reflecting their transition from traditional repositories to active participants in knowledge production (Cox et al., 2019). This evolution aligns with the view of libraries as institutions centered on knowledge creation and community engagement rather than passive information storage (Lankes, 2011).

At the pedagogical level, scholars advocate a shift from procedural to conceptual approaches in information literacy instruction. Traditional practices often focus on search techniques rather than deeper

understanding (Julien et al., 2018). In contrast, critical information literacy emphasizes questioning authority, power structures, and systemic inequalities embedded in information systems (Tewell, 2018). This shift is reinforced by the Framework for Information Literacy for Higher Education, which foregrounds threshold concepts such as “authority as contextual” and “information creation as a process” (Association of College and Research Libraries, 2016).

Information literacy is also understood as a socially situated practice shaped by context and experience, requiring more than technical competencies (Lloyd, 2017). The integration of digital and media literacy further highlights the importance of critical engagement and participatory culture in digital environments (Hobbs, 2017).

The concept of digital citizenship has evolved into a multidimensional construct encompassing ethical, technical, and civic dimensions. Early definitions emphasize responsible and ethical participation in digital environments (Ribble, 2011), while later studies expand this view to include safe and constructive online behavior (Jones & Mitchell, 2016) and the integration of critical thinking, technical competence, and democratic participation (Choi, 2016). At a broader level, global citizenship education promotes awareness of global interdependence, respect for diversity, and responsible civic engagement across multiple domains (UNESCO, 2015). Institutional evidence reinforces the importance of libraries in supporting student learning and success, thereby justifying their expanded role in critical and civic domains (Association of College and Research Libraries, 2017).

Collectively, these studies highlight the expanding and increasingly complex role of libraries in fostering critical literacy, ethical engagement, and civic participation. However, digital citizenship, algorithmic literacy, and global citizenship are often examined as separate constructs. Limited attention has been given to their integration within a unified framework. Addressing this gap forms the basis of the present study, which seeks to develop a holistic model integrating these interconnected dimensions within the context of contemporary academic libraries. Existing studies treat these domains as parallel rather than interdependent, and critically overlook the institutional role of libraries in structurally mediating this convergence.

Objectives of the Study

This conceptual study aims to:

- a) Reconceptualize libraries as civic-epistemic institutions in digitally mediated knowledge societies.
- b) Examine the convergence between digital and global citizenship in algorithmically structured environments.

- c) Analyze how libraries shape responsible digital and globally engaged citizenship through critical literacy and ethical technological practices.
- d) Propose an integrated framework linking digital literacy, digital citizenship, and global citizenship within library institutions.

Theoretical Convergence of Digital and Global Citizenship

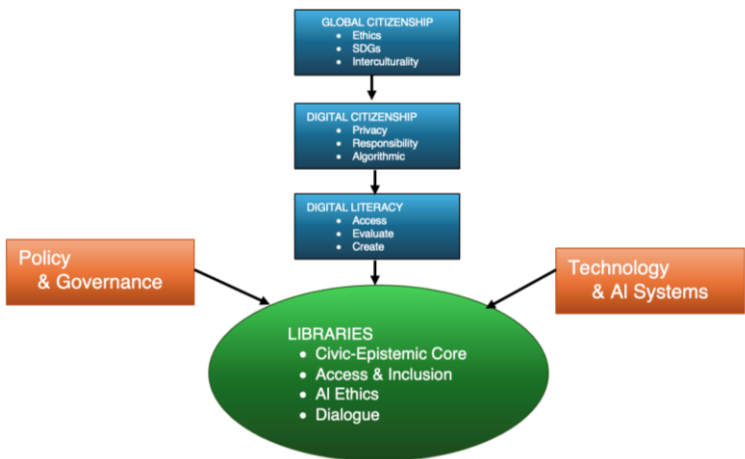
Digital citizenship and global citizenship are frequently conceptualized as distinct educational paradigms; however, in digitally networked societies, they increasingly intersect. Digital citizenship emphasizes ethical participation in online environments, including media literacy, privacy awareness, responsible communication, and critical understanding of algorithmic systems that shape information visibility (Choi, 2016; Ribble, 2011). Global citizenship, in contrast, foregrounds intercultural competence, social justice, democratic engagement, and awareness of transnational interdependence. While these frameworks originate from different pedagogical traditions, both aim to cultivate informed and responsible participation in complex social environments.

The convergence between these frameworks becomes evident when recognizing that global interaction is now largely mediated through digital infrastructures. Public discourse, civic mobilization, cross-cultural dialogue, and knowledge exchange increasingly occur on platforms structured by data-driven algorithms and recommendation systems. As Pasquale (2015) argues, these computational systems operate as “black boxes,” influencing perceptions of authority and relevance without transparency. Research indicates that students often rely on search engines and social platforms without critically examining how personalization and ranking mechanisms shape what they encounter (Head et al., 2020). In such contexts, meaningful global engagement depends not only on intercultural awareness but also on algorithmic literacy and critical digital discernment.

Failure to integrate these competencies may lead to technically skilled but ethically disengaged users or globally aware individuals lacking digital understanding. Scholars therefore emphasize the need to combine ethical reasoning with technological literacy (Lloyd, 2017; Ridley & Pawlick-Potts, 2021; Tewell, 2018; UNESCO, 2021). Building on this convergence, the proposed framework presents digital literacy, digital citizenship, and global citizenship as progressive and interconnected layers, as shown in Fig. 2. Digital literacy provides foundational skills, digital citizenship adds ethical and critical engagement, and global citizenship extends these toward global responsibility. The model is iterative, with feedback loops across levels. Libraries function as central mediators within this framework by enabling access, fostering critical and algorithmic literacy, and supporting ethical and globally engaged participation. Through this role, they facilitate the transition from functional digital skills to reflective and globally responsible citizenship.

This framework is grounded in sociotechnical and critical information literacy perspectives, which conceptualize knowledge systems as shaped by power, technology, and social interaction.

Fig. 2: Conceptual Framework of Digital and Global Citizenship Integration



Libraries as Agents of Digital Citizenship Formation

Libraries contribute to digital citizenship formation through interconnected pedagogical, advisory, and institutional practices that extend well beyond traditional information skills instruction. One of the most significant avenues is curriculum-embedded collaboration with faculty. Rather than offering isolated workshops, librarians increasingly integrate digital citizenship themes into disciplinary teaching, ensuring contextualized and sustained learning. For example, modules addressing algorithmic bias in social science research methods or privacy and data ethics in health sciences situate digital responsibility within disciplinary frameworks, strengthening relevance and retention (Julien et al., 2018). Such integration reflects a shift from episodic instruction toward embedded civic education within academic programs. In parallel, libraries have emerged as key facilitators of algorithmic and artificial intelligence literacy. As recommender systems, search algorithms, and generative AI tools increasingly shape knowledge production, libraries are developing instructional initiatives that demystify these technologies. Ridley and Pawlick-Potts (2021) emphasize the role of libraries in cultivating algorithmic literacy, while recent scholarship proposes responsible generative AI literacy models that foreground transparency, bias awareness, and ethical oversight (Cox et al., 2019). These initiatives position libraries at the forefront of helping users understand how computational systems influence visibility, authorship, and authority.

Libraries further advance digital citizenship through media and misinformation education. Instruction now extends beyond source evaluation to include critical examination of persuasive design, engagement metrics, and platform affordances that amplify particular narratives (Head et al., 2020). This enables libraries to equip users to recognize structural influences on information circulation rather than focusing solely on individual credibility judgments.

Beyond instruction, libraries contribute to institutional governance by advising on AI use policies, data management standards, and academic integrity frameworks. UNESCO (2021) underscores the importance of ethical AI governance in educational contexts, and recent studies note librarians' participation in institutional committees shaping responsible technology adoption. Additionally, libraries model ethical practice through privacy-respecting services, transparent discovery systems, and clear communication regarding embedded algorithmic tools.

Collectively, these pedagogical, advisory, and operational roles position libraries as instructors, mediators, and policy actors in digital citizenship formation, reinforcing their function as civic and epistemic institutions within digitally mediated societies.

Libraries as Agents of Global Citizenship Formation

Libraries contribute to global citizenship formation through practices that promote intercultural understanding, equitable knowledge access, and engagement with transnational issues. One foundational mechanism is the deliberate curation of diverse and multilingual collections. By providing access to international scholarship, global news sources, translated literature, and culturally varied materials, libraries expand the intellectual horizons of learners and expose them to multiple epistemic traditions. Such access fosters intercultural competence and supports the development of what global citizenship education identifies as perspective-taking and global awareness (UNESCO, 2015). In digitally interconnected societies, exposure to diverse viewpoints is essential for countering ethnocentrism and informational insularity.

Beyond collection development, libraries actively organize programming that connects local communities to global challenges. Dialogues, exhibitions, reading circles, and thematic events addressing issues such as climate change, migration, public health, and human rights situate global concerns within accessible civic spaces. These initiatives enable participants to understand how global phenomena intersect with local realities, reinforcing the relational dimension of global citizenship. Research on community-based library programming demonstrates that such interventions strengthen civic engagement and awareness of Sustainable Development Goals (SDGs) (IFLA, 2021).

Libraries also play a structural role in reducing global knowledge inequities. Through open access advocacy, institutional repository development, and international partnerships, libraries expand the availability of scholarly outputs beyond paywalled systems. Such efforts align with SDG 4 (quality education) and SDG 16 (inclusive institutions) by supporting equitable participation in global knowledge production. In contexts where libraries function as primary digital access points, particularly in underserved regions, their contribution to digital inclusion directly reinforces global citizenship objectives.

Finally, libraries serve as civic learning spaces that encourage respectful dialogue and collaborative inquiry across cultural differences. By maintaining environments grounded in intellectual freedom and pluralism, libraries nurture dispositions such as empathy, deliberation, and mutual respect, core attributes of global citizenship. Through these interconnected roles, libraries extend their mission beyond information provision to active cultivation of globally aware and socially responsible communities.

Digital to Global Citizenship

In contemporary society, citizenship unfolds within digitally mediated environments where participation, knowledge production, and civic discourse are shaped by technological infrastructures. It can therefore be understood as a layered progression that begins with digital literacy, expands into digital citizenship, and ultimately situates itself within global civic responsibility. These dimensions are not isolated constructs but interconnected stages of development that reflect the realities of networked knowledge societies.

At the foundational level lies digital literacy, which encompasses the technical and cognitive competencies required to locate, evaluate, interpret, and ethically use information within digital ecosystems. Information literacy frameworks emphasize the contextual nature of authority and the understanding that information creation is a process shaped by purpose and perspective (Association of College and Research Libraries, 2016). Digital literacy equips individuals with essential skills for navigating databases, evaluating sources, and managing digital content. However, while indispensable, this stage remains primarily functional unless accompanied by ethical and reflective awareness.

Building upon technical competence, digital citizenship introduces a normative and participatory dimension to digital engagement. It involves responsible communication, respect for digital rights and duties, awareness of privacy and data protection, and critical understanding of algorithmic systems that shape visibility and influence discourse (Choi, 2016; Ribble, 2011). In environments curated by search engines, recommendation systems, and artificial intelligence, users must recognize how technological

infrastructures mediate access to knowledge and construct perceptions of authority (Pasquale, 2015). Digital participation thus transforms from procedural interaction into reflective agency, characterized by ethical consideration and critical scrutiny of digital power structures.

Beyond ethical digital engagement lies a broader orientation toward global citizenship. As communication, scholarship, and civic dialogue transcend national boundaries, individuals participate in transnational digital publics. Global citizenship encompasses intercultural awareness, democratic participation, social justice consciousness, and recognition of global interdependence. In digitally networked societies, global responsibility is enacted through digital platforms; thus, digital citizenship functions as the operational means through which global civic engagement becomes practicable. Ethical digital practices, when aligned with global awareness, enable informed participation in conversations concerning sustainability, equity, governance, and human rights.

Within this layered understanding, academic libraries occupy a pivotal role. They facilitate equitable access to knowledge resources, provide inclusive digital infrastructures, and promote open pathways to information. Beyond access, libraries embed digital, media, and algorithmic literacy within instructional programs, fostering critical evaluation and contextual understanding of information systems (Julien et al., 2018; Ridley & Pawlick-Potts, 2021). They also create spaces for ethical dialogue and policy reflection, aligning educational practice with global principles of transparency, accountability, and human-centered technological governance (UNESCO, 2021). Through these interventions, libraries move beyond their traditional custodial role to function as civic and epistemic stewards within digital societies.

Understanding citizenship as a progression from technical literacy to ethical digital participation and ultimately to global civic consciousness allows for a more comprehensive interpretation of contemporary educational responsibilities. In higher education settings, particularly within academic libraries, this progression underscores the importance of cultivating not only digital skills but also reflective judgment, ethical reasoning, and globally informed civic engagement.

Illustrative Case Applications

To demonstrate the practical applicability of the proposed framework, selected national and international examples illustrate how libraries operationalize digital and global citizenship in practice. At the national level, the National Digital Library of India, developed by the Indian Institute of Technology Kharagpur under the Ministry of Education, provides extensive multilingual digital resources, thereby strengthening equitable access and digital literacy. Complementing this, the Digital India Programme enhances

digital infrastructure and enables citizens to engage with e-governance, online learning, and digital services through libraries and community access points, supporting informed and participatory digital citizenship.

Internationally, academic and public libraries have implemented initiatives focused on algorithmic literacy, artificial intelligence ethics, and digital inclusion. For example, the Harvard Library promotes open access through institutional repositories, while the Chicago Public Library advances community-based digital literacy and civic engagement programs. These efforts foster critical technological awareness and inclusive knowledge participation.

Collectively, these examples demonstrate that libraries function as active civic-epistemic institutions, enabling the progression from digital literacy to ethical digital participation and ultimately to globally informed citizenship.

Institutional and Policy Implications

Advancing digital and global citizenship through library practice demands deliberate institutional alignment across strategic planning, curricular integration, governance frameworks, and technological infrastructure. For higher-education institutions and public-library systems, digital and global citizenship must move from aspirational discourse to embedded organizational commitments. Strategic integration is essential. Libraries should incorporate digital and global citizenship objectives into mission statements, strategic plans, learning outcomes, and assessment frameworks. Embedding these competencies into measurable institutional goals ensures that citizenship formation is not treated as peripheral programming but as a core educational function.

Sustained faculty librarian partnerships represent another critical mechanism for implementation. Co-designed curricula that integrate algorithmic literacy, artificial intelligence awareness, and global ethical reflection across disciplines enable contextualized and sustained learning experiences (Julien et al., 2018). Rather than confining digital citizenship instruction to standalone workshops, embedding these themes within research methods, communication studies, social sciences, and professional programs strengthens disciplinary relevance and pedagogical continuity.

Institutional AI governance also requires active library participation. As universities develop policies addressing generative AI use, data governance, academic integrity, and algorithmic transparency, librarians possess expertise in information ethics and knowledge systems that can inform policy deliberations. International policy guidance emphasizes transparency, accountability, and human oversight in AI deployment (UNESCO, 2021), and emerging evidence suggests that librarians are increasingly being consulted in shaping responsible AI frameworks. Advocacy for privacy-preserving

discovery systems and transparent algorithmic tools aligns with libraries' longstanding commitments to intellectual freedom and user confidentiality. Professional development is equally critical. Librarians require ongoing training in AI systems, algorithmic bias, data ethics, and global pedagogy to effectively facilitate citizenship-oriented instruction. Institutional investment in such capacity building ensures that libraries remain responsive to evolving technological environments.

Finally, infrastructural commitments to digital inclusion and open access are central to equity-driven citizenship formation. Funding initiatives that expand broadband access, multilingual resources, and open scholarship infrastructures directly reduce global information inequalities. Recent case studies of public-library-led digital inclusion programs demonstrate tangible impacts on community engagement and SDG-aligned objectives. Through coordinated policy, partnership, and infrastructural investment, institutions can position libraries as strategic actors in cultivating digitally responsible and globally engaged citizens.

Conclusion

In an era where civic life unfolds through algorithmically mediated platforms and globally interconnected networks, citizenship can no longer be understood solely in national or analog terms. Meaningful participation requires the integration of digital competence, ethical discernment, and global awareness. The accelerating influence of artificial intelligence, data-driven infrastructures, and transnational communication systems has reshaped how individuals access information, engage in public discourse, and negotiate cultural differences. Within this landscape, the formation of responsible citizens demands more than technical proficiency; it requires structural understanding, normative reflection, and intercultural sensitivity. Libraries, grounded in longstanding commitments to intellectual freedom, equitable access, and democratic engagement, are uniquely positioned to address this multidimensional challenge. Emerging scholarship and institutional practice demonstrate that libraries are increasingly advancing algorithmic literacy, artificial intelligence ethics education, digital inclusion initiatives, and global engagement programming that collectively foster reflective, responsible, and globally engaged citizenship. These initiatives illustrate how libraries can translate foundational information skills into ethically informed digital participation and, ultimately, into globally conscious civic responsibility.

Realizing this expanded mission depends on strengthened institutional recognition, strategic policy engagement, and sustained professional development. When supported structurally and strategically, libraries function not merely as service units but as civic and epistemic stewards within the knowledge society. Repositioning libraries as agents of digital and

global citizenship formation affirms their central role in cultivating reflective, responsible, and globally engaged communities capable of navigating the complexities of digitally mediated public life. Future research may extend this framework through empirical validation across diverse institutional and cultural contexts.

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The Digital Frontier: Exploring the Impact of Digital Marketing on Libraries using Bibliometric Values

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Yasir Rashid Lone
Mahmood ul Ajaz Wani

Abstract

Purpose: The current study is an attempt to quantify the global scientific literature on digital marketing in libraries. Further, the study analysed the research productivity in terms of growth and impact of digital marketing research in the context of library and information centres.

Design/Methodology/Approach: To adequately cover the scientific output on library digital marketing research, Web of Science (WoS) was used to extract the bibliographic data using 345 keywords. A total of 344 documents from 79 sources were retrieved from 1989 to 2021. R-bibliometrix software and MS Excel were used for data analysis and cleaning.

Findings: The findings indicate a gradual increasing shift in research output from 2011 to 2015, followed by a decline after 2016. Citation impact varied across years, with 2007 achieving the highest citations per article and per year. The United States emerged as the most productive, most cited, and most collaborative country, followed by China. Network analysis showcased the prominence of the keyword social media. Author Joo S, and the Journal of Academic Librarianship emerged as central contributing author and Source respectively.

Practical Implications: The study traces trends in digital marketing research in libraries and underlines how digital marketing tools enhances library visibility, user engagement, and service outreach.

Originality/value: The study offers comprehensive bibliometric analysis for librarians and policymakers to adopt data-driven marketing strategies that improve resource utilization and institutional impact.

Keywords: Libraries, Marketing, Digital Marketing, Bibliometrics, Social Media Marketing, User Engagement.

Introduction

Academic libraries play a key role in providing diverse information resources and services to the users they serve (Deja et al., 2021). Historically, they have functioned as primary knowledge hubs supporting the educational, research, and pedagogical needs of students, faculty, and the wider scholarly community (Baer, 2021). Libraries also act as key mediators in the dissemination of knowledge by promoting best practices for information access and utilization among users (Sumadevi, 2014). However, this traditional position has been increasingly challenged with the rapid advancement of digital technologies (Sun et al., 2011). The widespread availability of smartphones, laptops, and internet-enabled devices has

enabled users to access vast amounts of information anytime and anywhere, reducing their dependence on physical library spaces. As a result, academic libraries have seen a clear drop in the number of people who use their services and visit them in person (Haleem et al., 2022). In this evolving information landscape, Helinsky (2014) warned that libraries are in risk and will becoming marginalized unless they actively demonstrate their relevance and value within the continuously expanding digital information ecosystem. Therefore, libraries must embrace transformation and reposition themselves to remain significant in the digital era.

One effective strategy for enhancing visibility and reaffirming institutional relevance is the adoption of digital marketing practices. Digital marketing refers to the promotion and branding of products or services through digital technologies and online platforms (Mandal, 2017). Digital Marketing does not only create a whole new way of marketing, instead it builds on old marketing ideas with new information technology tools (Marcos, 2013). The American Marketing Association (2021) defines digital marketing as marketing activities carried out via electronic platforms utilizing technological devices. Contemporary digital marketing further integrates emerging technologies such as artificial intelligence (AI) and the Internet of Things (IoT) to achieve marketing objectives across both consumer-to-consumer and business-to-consumer environments (Buhalis & Volchek, 2021; Petrescu et al., 2020). Since, marketing library products and services through electronic platforms have become essential for promoting awareness, improving outreach, and strengthening engagement with users, digital marketing in libraries should be hence viewed as a comprehensive organizational effort aimed at delivering user-centred services and fostering meaningful communication with stakeholders (ODonnell & Anderson, 2021; Shontz et al., 2004).

Popular Digital Marketing Platforms

Digital marketing platforms refer to the mediums used to communicate information about a brand, product, or service to the target audiences (Gunawan et al., 2023). Prominent digital marketing channels include website marketing, email marketing, and social media marketing (Valenti et al., 2024), affiliate marketing and pay-per-click (PPC) advertising (Almestarihi et al., 2024), video marketing, SMS marketing, and paid search advertising; as well as content marketing, broadcast media, mobile platforms, podcasts, and social media applications such as Facebook, YouTube, Instagram, X etc. (Kovalev et al., 2024; Kumar & Nanda, 2024).

Review of Literature

The swift advancement of digital technologies has revolutionised the methods by which libraries advertise their resources, services, and

engagement strategies (Haq & Jan, 2025; Mir & Khan, 2026). Digital marketing which encompasses social media, websites, search engine optimization, email marketing, and analytics has become a critical mechanism for sustaining the relevance of modern libraries. Consequently, scholarly interest in digital marketing within library and information science has increased, giving rise to empirical, conceptual, and bibliometric investigations. Wani (2023) and Le (2025) conducted bibliometric analyses focusing explicitly on digital marketing research in libraries. Using WoS data and science-mapping techniques, the authors analysed publication growth, prolific journals, leading authors, and thematic clusters. The results indicate that the number of publications has been steadily rising. The most common topics are social media marketing, digital outreach, and user engagement. Rykhtorova (2020) explored various library marketing websites and found digital marketing techniques applied in library contexts, emphasizing search engine optimization, social media platforms, email marketing, and content strategies. Mukhopadhyay (2023) examined the role of digital marketing services in boosting academic library usage, particularly in the Indian context. The study highlighted how digital platforms enhance the visibility and accessibility of library resources, aligning them with broader digital transformation initiatives in higher education institutions. Similarly, Sonawane and Thirunnavukkarasu (2023) discussed a reoriented digital marketing approach for library products and services. Their review identified recurring themes such as content marketing, social media engagement, and performance analytics, emphasizing the necessity of data-driven digital strategies in libraries.

Despite growing interest, bibliometric analyses specifically addressing digital marketing research in modern libraries remain scarce and fragmented. Existing studies often focus on limited datasets, short time spans, or single platforms. Moreover, there is insufficient synthesis of thematic evolution, collaborative networks, and geographic distribution within this research domain. Therefore, the present study adopts a bibliometric approach to investigate the current state and currency of digital marketing research in modern libraries. By analysing publication trends, influential authors, leading countries, collaboration patterns, and evolving themes, this study aims to provide a comprehensive and up-to-date mapping of digital marketing scholarship within library and information science.

Research Objectives

- a) To track the productivity and impact of scientific literature on digital marketing in libraries globally.
- b) To determine the most relevant authors and countries.
- c) To examine the collaboration patterns of authors, countries, and sources.

- d) To highlight the most impactful and relevant keywords thematically in digital marketing research related to the libraries.

Methodology

To adequately cover the scientific output on library digital marketing, WoS database was employed to extract the bibliographic data. WoS is one of the prominent research databases used in bibliometric studies (Ahmad et al., 2019; Ashiq et al., 2021; Ganaie et al., 2026; Shonhe, 2020; Siddique et al., 2020; Tripathi et al., 2018). The data was extracted on 10th of January 2024. But the timeline was limited to a three-decade period, i.e., up to 10 January 2021. The search query used was

(TI=(librar*)) AND TI=(marketi*), (TI=(librar*)) AND TI=(electr* marketi*), (TI=(librar*)) AND TI=(digit* marketi*) (TI=(librar*)) AND TI=(social media market*), (TI=(librar*)) AND TI=(blog), (TI=(librar*)) AND TI=(twitter*), (TI=(librar*)) AND TI=(social media), (TI=(librar*)) AND TI=(websit*), (TI=(librar*)) AND TI=(Market*) AND TI=(websit*), (TI=(librar*)) AND TI=(mail), (TI=(librar*)) AND TI=(sms), (TI=(librar*)) AND TI=(youtube), (TI=(librar*)) AND TI=(Electronic bulletin boar*), TI=(librar*) AND TI=(instagram), TI=(librar*) AND TI=(facebook) TI=(librar*) AND TI=(search engine optim*), TI=(librar*) AND TI=(Mobile App*).

A total of 344 documents from 79 sources were extracted for the analysis.

Software tools, refinement of data and analysis

A variety of bibliometric software applications are available for conducting bibliometric analysis which include HistCite, CiteSpace, VOSviewer, and Pajek. For the present study, the authors used the R-based bibliometric package Biblioshiny in conjunction with Microsoft Excel for analysis, visualization purposes and data refinement.

Results

Table 1: Main Information about the Data

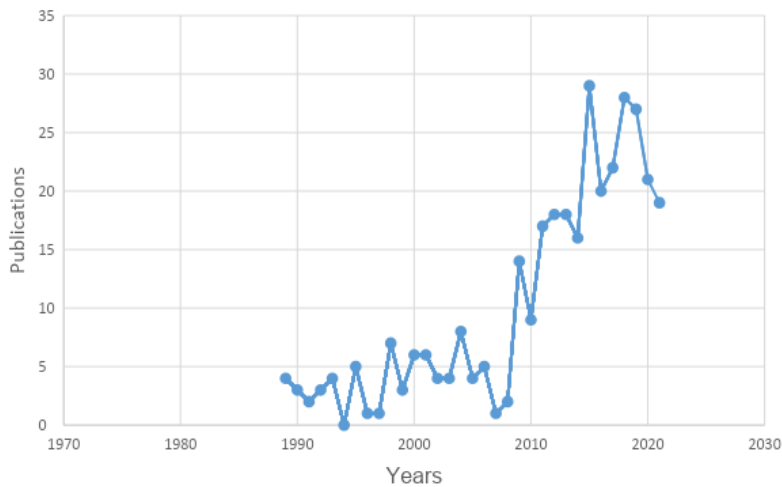
Timespan	1989-2021
Sources (Journals)	79
Documents (Articles)	344
Average years from publication	9.98
Average citations per documents	12.18
Average citations per year per document	1.221
References	7822
DOCUMENT CONTENTS	
Keywords Plus (ID)	345
Author's Keywords (DE)	608

Authors	
Authors	615
Author Appearances	762
Authors of single-authored documents	114
Authors of multi-authored documents	501
Authors' Collaboration	
Single-authored documents	130
Documents per Author	0.559
Authors per Document	1.79
Co-Authors per Documents	2.22
Collaboration Index	2.34

Annual Productivity

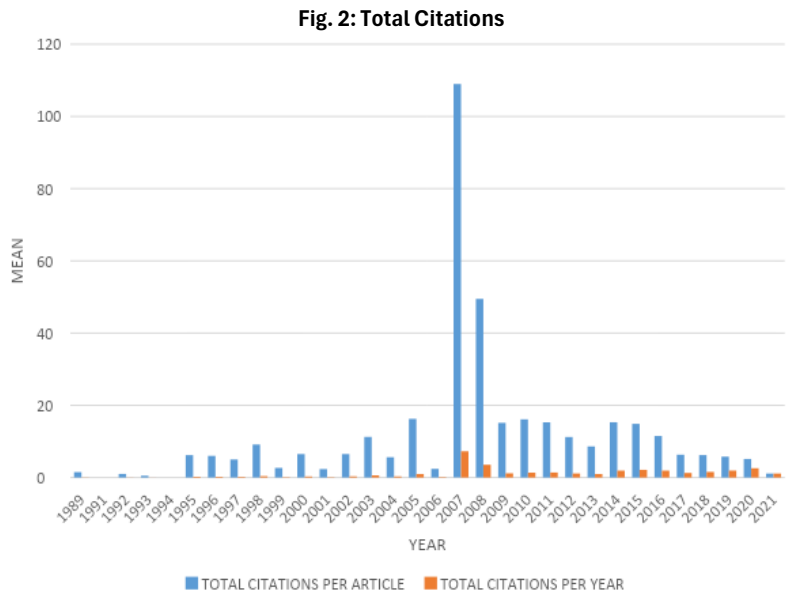
Fig. 1 illustrates the annual distribution of publications in the field under study. The highest research output was recorded in 2015 with 29 publications, followed closely by 2018 (28) and 2019 (27). A moderate level of productivity was observed during 2017 (22), 2020 (21), and 2016 (20), while 2021 contributed 19 publications. Earlier years such as 2012 and 2013 each produced 18 publications, followed by 2011 with 17 publications. In contrast, zero publications were recorded in 1991, marking the lowest level of research activity within the study period.

Fig. 1: Annual Scientific Production



Citation Count

Fig. 2 portray the pattern of citations per year alongside citations per article, reflecting the scholarly impact of publications over time. The results elucidate that articles published during 2007 received highest citation influence, leading in both citation indicators, which suggests strong academic recognition and sustained relevance of research produced during that period. Subsequent years, including 2008, 2010, 2009, and 2015, also exhibited considerable citation performance, indicating phases of increased research visibility and engagement within the field. Conversely, 1991 recorded the lowest citation impact, reflecting minimal scholarly attention or limited research output during the early stage of the study period.



Top Cited Countries (Top 10)

Table 2 presents the distribution of the most cited countries based on total citations and average citations per article. The United States emerged as the leading contributor, recording the highest citations (1,398) with an average of 9.64 citations per article, reflecting its dominant scholarly influence in the field. The United Kingdom ranked second with 1,226 total citations and the highest average citation impact (61.30), reflecting strong research quality and visibility. China followed with 471 citations and an average of 12.39 citations per article. Moderate citation performance was observed for Australia (162; 10.80) and Israel (99; 24.75), while Singapore demonstrated a comparatively high citation impact (44.00) despite fewer total citations

(88). Pakistan (69; 11.50), Korea (61; 15.25), Canada (59; 7.38), and New Zealand (59; 11.80) also contributed to the global citation landscape, highlighting diverse international participation in digital marketing research within libraries.

Table 2: Top Cited Countries (Top 10)

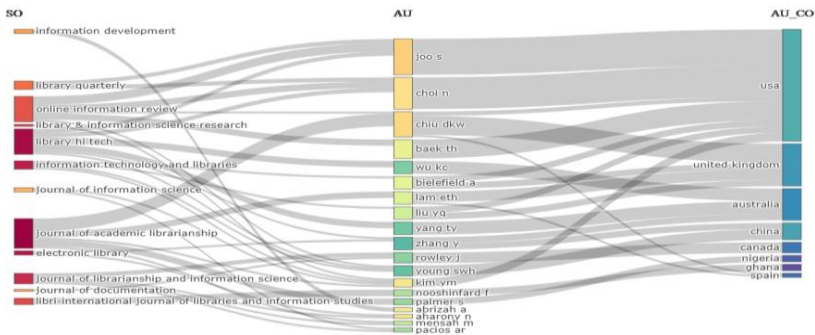
Countries	Total Citations	Average Citations
USA	1398	9.64
UK	1226	61.3
China	471	12.39
Australia	108	10.8
Israel	99	24.75
Singapore	88	44
Pakistan	69	11.5
Korea	61	15.25
Canada	59	7.38
New Zealand	59	11.8

Three-Field Plot Depicting the Distribution of Sources, Authors, and Countries

Fig. 3 demonstrates the structural relationship among leading countries, influential authors, and core publication sources, highlighting patterns of scholarly communication within digital marketing research in libraries. The network reveals that prominent authors, including Joo S, Choi N, Baek T.H., Chiu D.K.W., Lam E.T.H., Wu K.C., and Yang T.Y., are largely affiliated with research-intensive countries such as the United States, the United Kingdom, and Australia. Their strong association with journals like *Academic Librarianship*, *Library Hi Tech*, and *Online Information Review* indicates the concentration of high-impact research within well-established library science publication outlets.

Conversely, authors positioned on the peripheral side of the network, such as Young S.W.H., Pacios A.R., Abrizah A., Kim Y.M., Neves B.C., and Nooshinfard F., represent geographically diverse regions, including China, Canada, Ghana, Nigeria, and Spain, suggesting expanding global participation in the field. These authors primarily publish in journals such as *Journal of Academic Librarianship*, *Journal of Librarianship and Information Science*, *Information Technology and Libraries*, *Library Quarterly*, *Libri: International Journal of Libraries and Information Studies*, and *Journal of Documentation*. The recurring presence of the *Journal of Academic Librarianship* across both central and peripheral authors showcases its role as a key scholarly platform facilitating international knowledge exchange and dissemination in digital marketing research related to libraries.

Fig. 3: Three Field plot: Sources, Authors, and Countries



Keyword Co-occurrence Analysis

Fig. 4 presents the distribution of the twenty frequently occurring keywords, reflecting dominant research themes within digital marketing studies in libraries. The keyword *services* emerged as the most frequently used term, appearing 28 times, indicating a strong research emphasis on service-oriented applications of digital marketing in library environments. This was followed by *Facebook* (23 occurrences), highlighting the significant role of social networking platforms in scholarly discussions. Keywords such as *academic libraries* and *impact* (20 occurrences each), along with *information* (19) and *web* (18), further demonstrate the focus on evaluating digital engagement and information dissemination practices.

User and technology-oriented terms, including *students* (17); *model* and *Twitter* (13 each); and *adaptation*, *social media*, *university*, and *usage* (12 occurrences each), suggest growing scholarly interest in user behaviour, platform adoption, and institutional implementation of digital marketing strategies. Additionally, keywords such as *design* and *Web 2.0* (11 each), along with *digital libraries* and *website* (10 each), indicate the integration of technological innovation within library services. Less frequent yet notable terms, including *websites*, *knowledge*, and *networking* reflect emerging thematic directions. Overall, the keyword pattern highlights a shift toward social media-driven service delivery and digital user engagement as central research priorities in contemporary library marketing studies.

Top 10 Authors by Scholarly Impact

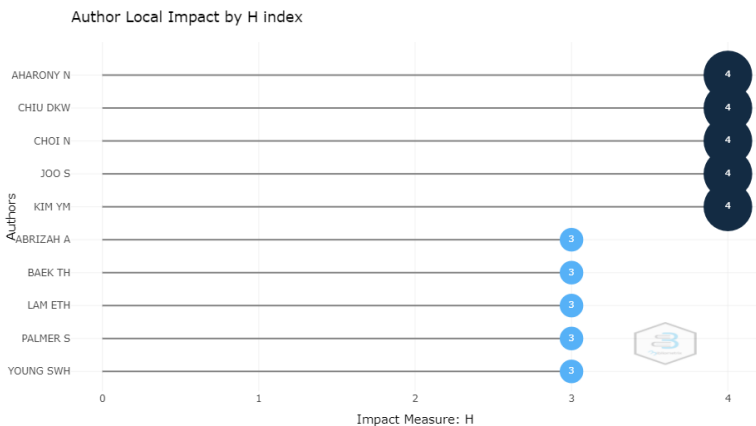
Fig. 5 illustrates the local H-index of leading authors, highlighting their scholarly impact within the dataset. The analysis shows that Aharony N, Chiu D.K.W., Choi N, Joo S, and Kim Y.M. achieved the highest local H-index value of 4, indicating consistent citation influence and sustained research contributions in the field of digital marketing in libraries. Authors including Abrizah A, Baek T.H., Lam E.T.H., and Palmer S. recorded an H-index of 3,

reflecting moderate yet notable academic impact. Young S.W.H., positioned at the lower end of the ranking with an H-index of 3, demonstrates comparatively limited citation influence within the analysed corpus. Overall, the distribution of local H-index values suggests a relatively balanced author impact structure, with several researchers contributing consistently to the development and visibility of the research domain.

Fig. 4: Word Cloud (Keyword Co-Occurrence)



Fig. 5: Author Impact

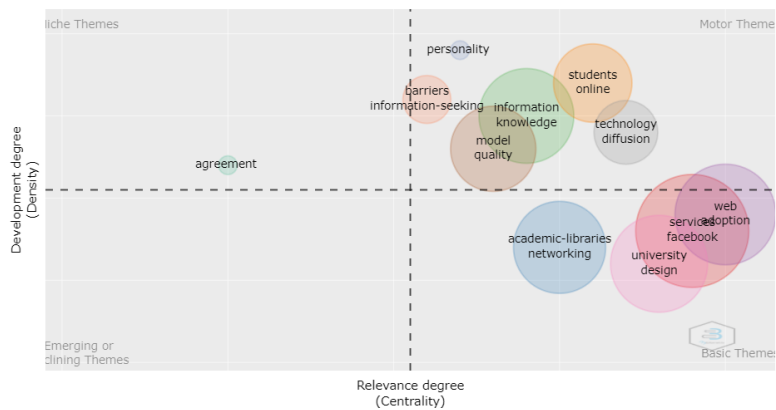


Analysis of Emerging and Core Themes

Fig. 6 presents the strategic diagram derived from the evaluation of author keywords, illustrating the thematic structure of research based on density and centrality dimensions plotted along the y-axis (density) and x-axis (centrality). Following the classification proposed by Cobo et al. (2011), the

diagram categorizes research themes into four quadrants representing varying levels of development and relevance within the field. The upper-left quadrant identifies highly developed yet specialized themes, where *agreement* emerges as an isolated but conceptually mature research area. Motor themes, located in the upper-right quadrant, include topics such as *information knowledge*, *model quality*, *student online*, *technology diffusion*, *barriers in information-seeking*, and *personality*, indicating strong internal development and high connectivity with other research themes, thereby driving scholarly discourse in the domain. The lower-right quadrant represents basic and transversal themes namely, *services*, *facebook*, *university design*, *web adoption*, and *academic libraries networking* which form the foundational and widely interconnected concepts supporting the overall research structure. Collectively, the strategic mapping highlights the evolving thematic landscape of digital marketing research in libraries, demonstrating both established conceptual foundations and specialized areas of scholarly advancement.

Fig. 6: Thematic Map



Discussion and Conclusion

The study analysed the growth, publication trends, collaboration patterns, and thematic evolution of research on digital marketing in libraries. The findings indicate a steady expansion of scholarly output, with 344 documents generating 4,187 citations, demonstrating increasing academic interest in marketing practices within library and information science. Consistent with earlier bibliometric studies, the publication trend shows a transition from limited early research activity to sustained annual productivity, reflecting the growing importance of digital engagement, user-oriented services, and online communication platforms in contemporary libraries (Siddique et al., 2020; Wani, 2024).

Author productivity and impact analysis revealed that a small group of researchers plays a significant role in shaping the intellectual structure of the field, supporting patterns identified in previous bibliometric research. Joo S emerged as the most productive author, while Aharony N demonstrated the highest scholarly influence based on the H-index. At the geographical level, the United States dominated research output and international collaboration networks, confirming earlier findings that developed countries lead advancements in digital marketing practices in libraries (Ashiq et al., 2021; Shonhe, 2020). Institutional contributions, particularly from the University of Kentucky, further highlight the concentration of research activity within established academic environments.

Thematic analysis emphasizes the service-oriented nature of library marketing research, with “services” identified as the most frequently used keyword. The prominence of social media-related themes depicts the ongoing transformation of libraries into digitally interactive and user-centred information spaces. Strategic thematic mapping shows a balanced research structure comprising motor themes, foundational themes, and specialized areas, indicating both conceptual maturity and emerging research directions.

Overall, the study confirms that digital marketing in libraries has evolved into a technology-driven and globally relevant research area. Future research should focus on emerging digital tools, interdisciplinary collaboration, and skill development initiatives to enhance marketing effectiveness and improve library visibility and service delivery in an increasingly digital information environment.

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Mapping the Scientific Literature of e-Services in Libraries: A Bibliometric Study

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Abstract

Purpose: The purpose of this study is to analyze the research trends and patterns in e-services in libraries by examining the literature published over three decades.

Design/Methodology/Approach: Web of Science (WoS) was used to obtain the scientific publications on e-services of libraries. The data was extracted on 31-December-2021. The search query applied to get the desired results is $((TS = (DIGITAL\ LIBRAR^*))\ AND\ TS = (ELECTRONIC\ SERVIC^*))\ OR\ TI = (DIGITAL\ LIBRARY\ SERVIC^*))\ AND\ TI = (E-SERVIC^*)$ and Articles After refinements and removal of duplicates the total of 2300 articles were retrieved within a specific time. R software was used for data visualization and analysis.

Findings: The study revealed that the highest number of articles were published in 2015 and the highest mean total citation count per article belongs to 2011. It is revealed that the Academic of Librarianship had published the highest number of records. The most occurred keywords are "Information" and "Model". It is also revealed that the word "Information" has the highest growth rate. It was determined that the USA has the highest productivity and citations followed by the UK and China. Cook C, and Thompson B are the most Prolific authors revealed in the study. It was also revealed that the University of Illinois, Chicago was the most prolific institution.

Practical Implications: The findings can help libraries in developing e-services by highlighting current research trends and identifying leading institutions and authors in the field. This can help in formulating policies and strategies that meet the evolving needs of the digital age.

Originality/Value: The study is confined to articles indexed in the Web of Science database, which may not reflect the scope of research on e-services in libraries. This study provides valuable insights into the research landscape of library e-services.

Keywords: E-services, Bibliometric analysis, Research trends, Digital Library

Introduction

Bibliometrics deals with the quantitative analysis of written communication. "Philosophical Transactions of Royal Society" in 1665 marked the beginning of journal publication but journals became popular in 1900s when journals got attention from the students and scholar community. Thus, it paved the path for the bibliometric analysis of written communication. The term "Bibliometrics" was first coined by Pritchard in 1969 (Nicholas & Ritchie, 1978). Pritchard (1969) defined it as, "the application of mathematical and statistical methods to Bibliographic information of books and other media of communication". There are three types of bibliometric indicators: quantity indicators, which measure the productivity of a particular researcher, quality indicators, which measure the quality or performance of a researcher's

output and structural indicators, which measure connections between publications, authors, and areas of research. From its very beginning, Bibliometrics has been associated with the identification of the main journals, ranking of journals, sorting of good magazines, the contribution of institutes, authorship patterns, literature in a particular field, and much more. Bibliometrics has helped scholars and policymakers to identify the active areas and important ones (Shamsi et al., 2022).

The rapid development of libraries and the growth of literature generated several studies about the efficiency and effectiveness of information services. These studies led to the identification of appropriate quantitative measuring techniques and their applications known as Bibliometrics (Nidhi, 2016). Bibliometrics is a new subject of recent origin. It is the branch of the library and Information science that analyze the behavior and properties of the recorded knowledge quantitatively (Song et al., 2023). The libraries and information managers all over the world began to use Bibliometric techniques in their day-to-day administration (García-Villar & García-Santos, 2021). Bibliometric techniques help researchers in the era of information explosion to quantify the process of written communication. Various mathematical and statistical tools are used by researchers to analyze and measure the scattering of literature output of a particular subject through language-wise, document type-wise, institute-wise, geographical-wise, etc. (Patil et al., 2023). It is also used to identify the pattern of publication, authorship, citations used for a subject, etc. over some time and thereby offer insight into the dynamics of an area under study (Song et al., 2023).

Bibliometric data helps us to explore trends, both within a country and worldwide as well as track collaboration patterns among individual researchers, institutions, and countries (Afuye et al., 2022). In the research world, the bibliometric study is not new. The Bibliometric word has been derived from two words 'Biblio' and "Metric". The word "Biblio" means "Books, Documents" and "Metric" means "a Scale or Measure" (Sethukumari, 2016). In other words, we can say that Bibliometrics is the application of statistical studies in library and information science (Afuye et al., 2022). Bibliometrics is gaining popularity among researchers of all disciplines. According to Belter (2018), bibliometrics deals with four major themes: productivity, collaboration, research topics, and citation impact. He terms it as, "a science of science". Bibliometric analysis provides valuable information and extends systematic comparison among institutions, and countries. (Kraus et al., 2022; Mukherjee et al., 2022; Paul-Lim et al., 2021).

Review of Literature

Services in libraries include the typical traditional library and information services and other global information services through computers and telecommunications etc. Lateef et al. (2024) showed the various services

provided by the libraries in e-format which include: Online Reference services, current awareness services, Subscription services, Audio and video communication services, electronic document delivery Services, Interoperability services, online cataloguing services like OPAC, chat-services, indexing and abstracting services etc. Fagbohun et al. (2020) demonstrated that libraries establish an omnipresent remote access facility covering service regions and integrating online reading services, online databases, multimedia databases and large-scale electronic reference books etc., thus meeting the readers' needs for browsing digital information in the library or anywhere. Digital services are widely available in many regions of the world, and communication with the government is increasingly automated. Lindgren et al. (2019) and Rose et al. (2015) suggest that while this is generally promoted as a cost-saving approach, it also helps citizens by improving the speed and availability of services.

Current trends in academic communication are evidenced by manifestations of language dominants. It has been shown that English-speaking societies use the global distribution of the English language to promote their competitive advantages in science. Huang and Xue (2020) and Tchuifon et al. (2017) conducted bibliometric which studies revealed that most of the articles were published in English language. Chiu and Ho (2005) further revealed that Japanese and German are the prominent languages used after English for publications.

The number of researchers and scientific papers rapidly grows, annually. The metrics to analyze the quality and quantity of these publications have consolidated in the academic world. Different countries produce a lot of literature annually. A number of bibliometric studies have been conducted like Chiu and Ho (2005) showing that the most articles were published by UK followed by USA. Chiu and Ho (2005), Dabi et al. (2016), Gonçalves et al. (2021), Haunschild et al. (2016), Liu et al. (2018), Sachdeva et al. (2021), Van et al. (2018), Vioque et al. (2010), and Zhang et al. (2019) in their study revealed that most of the literature was published by USA followed by United Kingdom. Bibliometric methods estimate how much influence or impact a document type has on future research. It usually does this by counting the number of times a document type is cited after it is published. Boamah and Ho (2017), Chiu and Ho (2005), Fu et al. (2014), Uzunboylu and Ozcinar (2009), Vioque et al. (2010), and Wang et al. (2010) revealed that articles are most preferred and used document type followed by review papers.

Objectives

- a) To explore the productivity and impact of scientific literature on e-services in libraries globally.
- b) To identify and elucidate the impact of most relevant authors, articles, journals, institutions and countries.

- c) To highlight the most impactful keywords used.

Methodology

To exhaustively cover the scientific output of e-services of libraries. Web of Science (WoS) was used to obtain an underlying corpus of abundant scientific publications. The data was extracted on 31 December 2023.

The search query applied to get the desired results is

((TS=(DIGITAL LIBRAR*)) AND TS=(ELECTRONIC
SERVIC*)) OR TI=(DIGITAL LIBRARY SERVIC*)) AND TI=(E-
SERVIC*) and Articles.

After refinements and duplicate removal, a total of 2300 articles were retrieved within the specified time frame from 1989 to 2021.

The R-Bibliometric package was utilised for the methodological execution and analysis of bibliometric studies. This software is selected for its capabilities in providing comprehensive evaluation and insightful visualisation of bibliometric data across diverse academic disciplines.

Data Analysis and Interpretation

Table 1 demonstrates the main information about the study. The table shows that the current study comprises 2300 Documents/articles spanning 30 years from 1989 to 2021. The records are retrieved from 501 sources, having an average citation of 0.86 per document per year, 14 Average Years from Publication and 8.87 Average citations per document. In this study, it is further revealed that the records have 51702 references with 5513 author appearances and 4787 Authors comprising of 877 Single-authored documents. These records are retrieved using 1659 Keywords plus (ID) and 3145 Author’s Keywords. The study portrayed a total of 810 Authors of single-authored documents and 3977 Authors of multi-authored documents. From the table, it is evident that there are 0.48 Documents per Author, 2.08 Authors per Document and 2.4 Co-Authors per Document with a Collaboration Index of 2.79

Table 1. Main Information about Data

Description	Results
Timespan	1989-2021
Sources	501
Documents	2300
Average years from publication	14
Average citations per documents	8.87
Average citations per year per doc	0.86
References	51702
Article	2300
Keywords Plus (ID)	1659
Author’s Keywords (DE)	3145

Authors	4787
Author Appearances	5513
Authors of single-authored documents	810
Authors of multi-authored documents	3977
Single-authored documents	877
Documents per Author	0.48
Authors per Document	2.08
Co-Authors per Documents	2.4
Collaboration Index	2.79

Average Total Citation Productivity of Articles

Table 2 deals with Average Total Citation Productivity of Articles. These articles are categorized year wise. From Table 2, it is evident that the highest number of articles is published in 2015 (102), followed by 2017 (99), 2009 and 2020 (88) and the least number of articles is published in 1989 (27), followed by 1990 (33). Further, the year 2011 has the highest mean total citation count per Article (24.47), followed by 2004 (16.01) and 2001 (15.35). The least mean total citations per article is in 2021 (1.27), followed by 1990 (2.03). Furthermore, the highest mean total citations per year are in 2011 and 2020 (2.44), followed by 2016 (2.37) and 2018 (1.93). The least mean total citations per year is in 1990 (0.06), followed by 1989 (0.07) and 1998 (0.08).

Table 2: Average Total Citation Productivity of Articles

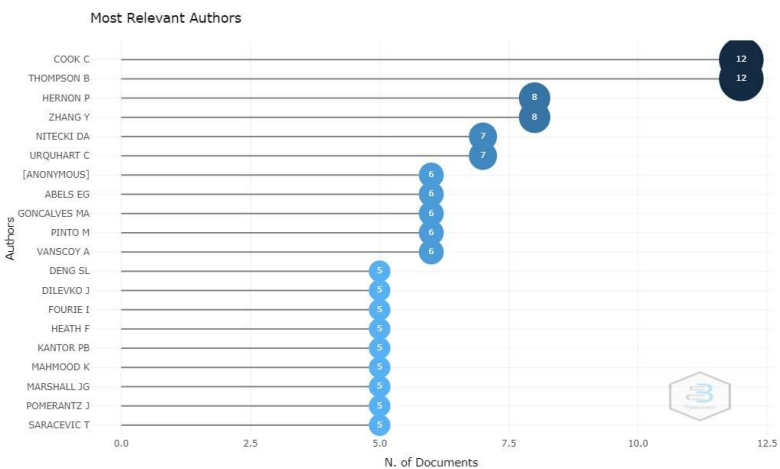
Year	N	MTA	MTY	CY	Year	N	MTA	MTY	CY
1989	27	2.4	0.07	32	2006	79	11.7	0.78	15
1990	33	2.03	0.06	31	2007	73	10.56	0.75	14
1991	64	3.82	0.12	30	2008	83	14.84	1.14	13
1992	43	3.88	0.13	29	2009	88	13.35	1.11	12
1993	47	2.46	0.08	28	2010	81	9.25	0.84	11
1994	61	5.31	0.19	27	2011	69	24.47	2.44	10
1995	63	6	0.23	26	2012	81	8.75	0.97	9
1996	55	9.03	0.36	25	2013	82	11.96	1.49	8
1997	63	7.9	0.32	24	2014	74	9.67	1.38	7
1998	57	6.54	0.28	23	2015	102	7	1.16	6
1999	39	10.25	0.46	22	2016	78	11.87	2.37	5
2000	61	12.09	0.57	21	2017	99	6.8	1.7	4
2001	68	15.35	0.76	20	2018	74	5.79	1.93	3
2002	63	9.68	0.5	19	2019	83	3.54	1.77	2
2003	66	12.19	0.67	18	2020	88	2.44	2.44	1
2004	78	16.01	0.94	17	2021	86	1.27		0
2005	63	8.22	0.51	16					

MTA = Mean Total Citation per Article; MTY = Mean Total Citation per Year; CY = Citable Year

Most Prolific Authors

Researchers worldwide are publishing articles across various fields with different publishing houses. The present findings represent the most prolific authors from selected data in the Web of Science, with Cook C and Thompson B having the highest number of documents (12), followed by Hernon P and Zhang Y (8). Saracevic T, Pomerantz J, Marshall J.G and Mahmood K have the least number of documents (5) respectively (Fig. 2). A similar trend of exploring the relevant authors was found in the study of Ahmad et al. (2018).

Fig. 2: Most Prolific Authors



Top 10 Productive Countries

It is evident that the U.S.A. (1398) has the highest productivity of articles, followed by the U.K. (405) and China (356). The results are in line with the studies, like, Goncalves et al. (2021), Haunschild et al. (2016), Sachdeva et al. (2021), Shonhe and Liah (2020), and Zhang et al. (2019). Their studies also showed that the USA has the highest production of articles. Possible reasons include the USA leading in LIS schools (Ahmad et al., 2019).

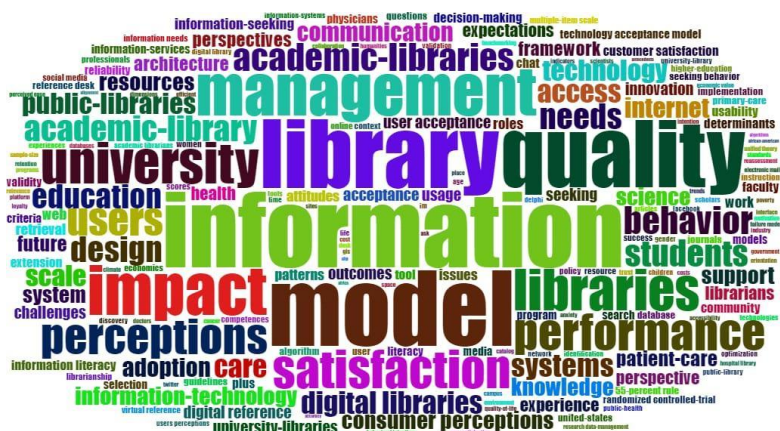
Table 3. Top 10 Countries with the Highest Number of Publications

Region	Frequency	Region	Frequency
USA	1398	Spain	126
UK	405	Germany	117
China	356	South Korea	72
Canada	217	Japan	69
Australia	136	South Africa	61

Most Frequent Keywords

Fig. 4. shows the map of frequent keywords. The most keywords are an essential factor in searching the literature. The current study represents occurrences of words from which *Information* and *Model* have the highest occurrences, i.e. (67) both, followed by *Library* (61) and *Quality* (60). In contrast, *Systems*, *Education* and *Needs* have minimal occurrences with (21), (22), and (23) respectively (Table 4).

Fig. 4: Keyword Map

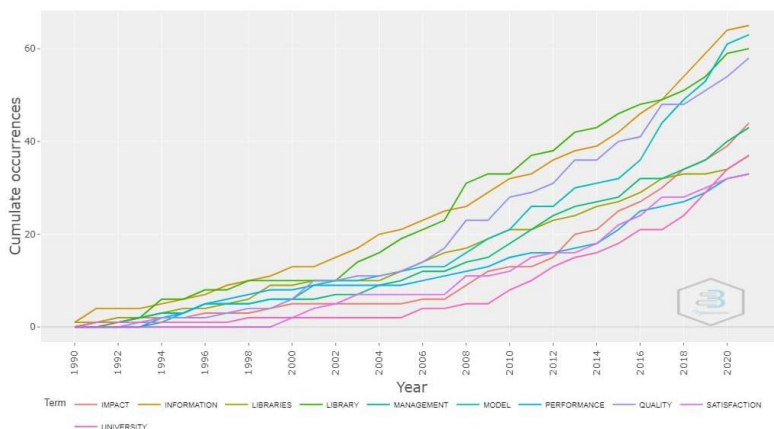


Word Growth

Fig. 5 shows the growth of words over a selected period of time, in which it is clearly visible that information has the highest growth, followed by model and library, while performance, satisfaction, and university show steady growth from 1990 to 2020.

Table 4: Most Frequent Word

Words	Occurrences	Words	Occurrences
Information	67	Perceptions	32
Model	67	Users	29
Library	61	Academic-libraries	25
Quality	60	Behavior	25
Impact	44	Students	24
Management	44	Academic-library	23
Libraries	37	Design	23
University	37	Needs	23
Satisfaction	34	Education	22
Performance	33	Systems	21

Fig. 5: Word Growth

Findings

The effectiveness of an academic institution's digital resources and services in serving its community is fundamental to its sustainability and relevance. The study reveals that the highest mean total number of citations per article was 2011, suggests that during this period, research outputs were not only more visible but also more influential, which could be due to the maturation of digital library systems and wider accessibility of scholarly communication platforms and the year with the most publications was 2015 expansion phase in academic librarianship research, where scholars increasingly engaged with emerging digital frameworks and service models. It was discovered that academic librarianship has the most records (1260) published and the largest number of global citations. Additionally, it comes to light that the academic field of librarianship had the greatest source impact. The keywords "Information" and "Model" are frequently used. The word "Information" has the fastest rate of growth, disclosing focus on structuring, managing, and optimizing information systems. It was found that the United States produces the most articles, or (1398), followed by the United Kingdom (405) and China (356), and is the most referenced nation with 118018 citations indicating that research activities are becoming more globally distributed, even if disparities still exist. With (12) documents each, Cook C. and Thompson B. are the most pertinent and productive authors identified in the study. With 59 publications, it was discovered that the University of Illinois at Chicago has the most pertinent associations reflects that both individual scholars and institutions play a key role in shaping the field, although the concentration of output suggests that influence may be limited to certain groups.

Conclusion

To meet the demands of users in the 21st century and stay relevant in their communities, librarians must constantly engage in professional development due to the rapid changes in technology and their impact on how information is accessed, and library services are provided. Hence, the primary objective of this study was to provide a comprehensive descriptive analysis of the available literature concerning electronic services offered by libraries. In today's digital age, electronic resources and services hold a significant and valuable place. These digital offerings, extended by libraries, play a pivotal role in the functioning of both academic institutions and government entities. The effective utilization of these online tools and services is of paramount importance. Overall, the study indicates that while the field is evolving and expanding, certain imbalances and concentrations of impact still persist.

Implications

The findings can help libraries in developing e-services by highlighting current research trends and identifying leading institutions and authors in the field. This can help in formulating policies and strategies that meet the evolving needs of the digital age.

Limitations of the study

The current study is specifically limited to the document type "Article" sourced exclusively from the Web of Science (WoS) database. Consequently, other widely recognized databases such as PubMed, Dimensions, and Scopus, among others, have not been utilized, leading to a restricted scope of information retrieval from these alternative global databases.

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Screen Time Exposure and its Association with Physical Health and Eating Behaviors among Children Aged 6–12 Years

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Abstract

With advancement in today's digital age, screens have become an integral part of our daily life, and children are exposed to digital media from an early age. There are growing concerns about the potential negative impacts of excessive screen time on the development of children in various spheres of life. The impact of screen time among children between 06-12 years stems from the rapid increase in digital media consumption in this age group. Children aged 06-12 years are in a critical developmental stage where excessive screen time can potentially influence their cognitive, physical, and socio-emotional growth. This study explores the impact of screen time on children aged 06-12 years by examining its effects on physical health and eating habits through comprehensive statistical analyses. Data was collected from 100 children (48 boys, 52 girls) from urban and rural areas using purposive sampling. Advanced statistical methods including chi-square tests, correlation analysis, odds ratios, effect size calculations, and multivariate regression were employed. Results revealed mean daily screen time of 2.34 ± 1.52 hours, with 32% exceeding recommended limits. Excessive screen time (>2 hours/day) showed significant associations with vision problems ($OR = 3.21, p < .01$), eating disturbances ($OR = 2.84, p < .01$), and sedentary behavior ($OR = 4.12, p < .001$). Correlation analysis demonstrated strong positive relationships between screen time and overall health impact ($r = .58, p < .001$). Multiple regression analysis revealed that screen time duration, urban residence, and age collectively explained 42.3% of variance in health outcomes ($R^2 = .423, p < .001$). The study provides robust evidence for the detrimental effects of excessive screen time and recommends comprehensive interventions including time limits, screen-free zones, and parental education.

Keywords: screen time, school children, digital age, physical health, eating habits

Introduction

Screens have become an integral part of our daily life, and children are exposed to screens from an early age. Screens are used for educational purposes, entertainment, socializing, and communication. However, there are growing concerns about the potential negative impacts of excessive screen time on children's development (Singh & Balhara, 2021). The pervasive rise of digital media and screen-based entertainment has transformed the developmental landscape for children and adolescents, with research showing that excessive screen time is correlated with increased risk for obesity, cardiometabolic factors, mental health issues, unhealthy dietary habits, and problems in development (Muppalla et al., 2023). Many parents and caregivers worry about the harmful effects of

screen time and have started to set limits on their children's digital media use. Recent studies from 2024 indicate that pre-teens and teenagers now spend an average of 5.5 to 8 hours per day on screens, representing a significant increase from previous years (Yang, 2024).

The amount of time using screens each day is known as screen time. The World Health Organization (WHO, 2024) acknowledges this as a significant issue for children's overall development. Recent systematic reviews have demonstrated that excessive screen time can lead to poor language and speech development, obesity, poor sleep quality, and a decline in social and emotional skills (Zong et al., 2024). Adequate physical activity during childhood is essential for the development of fundamental abilities in motor, cognitive, and social domains as well as for the maintenance of musculoskeletal, cardiovascular, and metabolic health. It prevents childhood obesity and early metabolic risk factors.

The 21st century brought with it the widespread availability of technical devices (computers, televisions, and mobile phones) in every home. Screen time, or the amount of time spent in front of electronic devices, is quickly becoming the most prevalent kind of sedentary lifestyle for young children and adolescents. A longitudinal study by Nagata et al. (2024) involving diverse groups of preteens found that more screen time was significantly associated with more severe symptoms of depression, anxiety, inattention, and aggression over a two-year period. Research indicates that screen time has steadily increased over the past decade, with concerning implications for child health (Horner et al., 2025). The World Health Organization (WHO, 2024) has acknowledged the risks of a sedentary lifestyle in front of technological devices and their effects on the human body from a young age. The term "screen time" refers to any amount of time spent passively viewing entertainment on a screen (WHO, 2024). Since experts in various scientific fields have started to address issues resulting from excessive screen time, a new term, "glow kids," has been associated with this phenomenon in recent years. Indian studies show a similar trend as the western world with initial exposure to screen-based media as early as 2 months of age and median age of first exposure to screen at 10 months. Most children are exposed to screen-based media by 18 months of age, with greater usage of smartphones (96%) than television viewing (89%). Nearly 65% of families keep their television on while having dinner (Meena et al., 2020). In another Indian study, four out of five preschool children reported using smartphone devices, primarily for games and videos. Lanca and Saw (2020) conducted research on the effect of electronic media on children and found that radio, television, movies, video games, cell phones, and computer networks have played a central role in children's daily lives in recent years.

A number of studies have been conducted on how screen exposure correlates with the health outcomes of children. The overuse of screens has

been linked to various adverse physical and psychological effects, such as lack of physical activity, predisposition to obesity, sleep disorders, poor social development in children and adolescents. Studies also show that the excessive use of digital devices decreases the level of physical activity and leads to the development of sedentary lifestyles, which can cause long-term health issues (Muppalla et al., 2023). Moreover, the higher exposure to screens has been associated with poor eating habits like snacking in front of screens and increased intake of high-energy food.

The effects of the digital media on visual health and behavioral outcomes in children have also been identified in previous studies. Research has indicated that smartphone and tablet overuse is linked to eye strains, headaches, and digital eye fatigue symptoms in school-going kids (Lanca & Saw, 2020). Moreover, longitudinal data indicate that excessive screen time might be a contributing factor to emotional and behavioral disorders, such as anxiety, irritability, and attention dysfunctions (Nagata et al., 2024). These results underline the significance of researching the impact of screen exposure on various facets of children health, such as physical health and diet.

Literature Review

Screen time and sedentary lifestyle

Sedentary behavior among children has been commonly linked with excessive screen time, which may harm the results of physical fitness and health. Unhealthy habits like excessive time spent watching TV, playing video games, and using a smartphone decrease physical movement and outdoor activities. Research has demonstrated increased likelihood of children with more screen time to develop unhealthy lifestyle habits, such as poor levels of physical activity, susceptibility to obesity and metabolic disorders (Stavridou et al., 2021). The behavioral trends can have long-term health implications unless they are corrected at the early stages of development.

Screen time and eating habits

Screen time usage has also been associated with the unhealthy eating habits of children because of screen exposure. Studies indicate that children tend to eat snacks or meals in front of the TV or mobile gadgets, which can result in overeating and unhealthy eating habits. Receiving food advertisements in digital media also changes the preferences of children to foods, which tend to trigger a desire to eat energy-dense and processed foods (Meena et al., 2020). Consequently, school-aged children might have an indirect role in unbalanced nutrition and improper food habits due to excessive screen time.

Screen time and psychological outcomes

Besides the physical health hazards, a lot of digital media can also affect the psychological health of children. There is some evidence that suggests that prolonged screen exposure is linked to emotional and behavioral issues like irritability, anxiety and a lack of focus. It has been shown that excessive screen time may interfere with sleep and social life, which are critical to a healthy emotional development (Dienlin & Johannes, 2020). These results underscore the need to explore the psychosocial consequences of being exposed to digital media among children, on a larger scale.

Theory

The Sedentary Behavior Theory that was used to support the current research also implies that the long-time activities involving screens decrease physical activity and cause sedentary lifestyles that could be detrimental to health. This view holds that more time spent at digital devices may leave physical activity behind and shape the dietary habits, thus leading to the poor physical and behavioral health outcomes of children. Also, the Social Learning Theory says that children tend to emulate behaviors they see in the media such as eating patterns and lifestyle choices. Thus, in the long term, frequent exposure to media on screens can affect the preferences, behaviors, and health patterns of children (Bandura, 2001; Tremblay et al., 2017).

Research gap and need research

Although there is an increasing amount of evidence on the health consequences of screen exposure, there is a paucity of research that has explored the synergies between screen exposure and physical health and dietary behaviors in children both in urban and rural settings. The available literature is mainly concerned with one of the health outcomes, i.e. obesity or mental health, and does not consider the multifaceted effect of screen use. Thus, the current research would fill this gap by examining the effects of screen time on physical well-being and dietary patterns in children aged 6-12 years both in urban and rural areas.

Objective of the Study

To study the impact of screen time on physical health and eating habits of children.

Methodology

The respondents were selected from both urban and rural areas; a total of 100 children were selected for the study. Data was collected from both urban and rural areas and purposive sampling technique was used. Mothers were also involved in collecting relevant information as children of this age group (6-12 years) cannot respond well to all questions.

Sample Size: The sample comprised of 100 children, out of which 48 were boys and 52 were girls. The 100 participants used in this study were deemed

sufficient to perform statistical analyses in this study. Past methodological supervision guidelines suggest that 80-100 sample populations are usually adequate to conduct correlation and regression-based examinations in social science studies in cases where we are investigating moderate relationships amid variables. Though purposive sampling constrained the generalizability of findings, it provided the researchers an opportunity to sample out participants that met the study criteria and provided representation of urban and rural situations. Through this method, it was possible to critically analyze screen time behaviors and related health outcomes among school-aged children (Hair et al., 2019).

Tools Used: A well-designed interview schedule was used to collect relevant information. An informed consent was also taken from respondents to participate in the study.

The SPSS 27 software (IBM Corp., Armonk, NY) was used in the data analysis but with several statistical methods. All variables were subjected to descriptive statistics such as frequencies, percentages, means and standard deviations. Associations between the categorical variables were tested with chi-square tests of independence, with a statistical significance of $p < .05$. Statistical tests were Pearson correlation, logistic regression to estimate odds ratios, measures of effect sizes (Cramer V and Cohen D), and multiple regression analysis to test the joint effect of the duration of screen time, age, gender, residence, and type of device on overall health outcomes.

Data Analysis: SPSS 27 software (IBM Corp., Armonk, NY) was used to analyze the data. All variables were subjected to descriptive statistics such as frequencies, percentages, means and standard deviations. Chi-square tests were used to examine associations between categorical variables. Additional analyses were Pearson correlation, independent sample t-tests, logistic regression to estimate odds ratio (OR) with 95% confidence interval, estimation of the effect sizes using Cramer V and Cohen d, and multiple regression analysis to determine the joint effects of the duration of screen time, age, gender, residence, and device type on overall health outcomes. Standardized indicators were added together to obtain composite health scores and all statistical tests were done with a p value of $p < .05$, which is two tailed.

Statistical analyses included: (1) Pearson correlation coefficients to assess linear relationships between continuous variables; (2) independent samples t-tests to compare mean differences between urban and rural groups; (3) logistic regression analysis to calculate odds ratios (OR) with 95% confidence intervals for risk assessment of health outcomes associated with excessive screen time; (4) Cramér's V and Cohen's d for effect size estimation to determine practical significance; and (5) multiple regression analysis to examine the combined effects of screen time duration, age, gender, residence, and device type on overall health outcomes. Composite

health scores were created by summing standardized scores across multiple health indicators. All statistical tests were two-tailed, and assumptions for parametric tests were verified prior to analysis.

Results and Discussion

In the present study, 48% were boys and 52% were girls belonging to urban and rural areas. Thirty-nine percent belonged to the age group of 6-9 years and 61% belonged to the age group of 9-12 years, comprising children from urban and rural areas. Moreover, 46% studied in 1st to 3rd standard and 54% studied in 3rd to 6th standard.

Screen Time Habits

Table 1 shows the distribution of children as per the time spent and type of screen used by the children. Data revealed that 44% of children from urban areas spent 1-2 hours on screen while 32% spent less than 1 hour, 20% spent 2-3 hours, and only 4% spent more than 4 hours on screen. Moreover, 35% of children from rural areas spent 1-2 hours on screen, 34% spent less than 1 hour, 22% spent 2-3 hours, and 18% spent more than 4 hours on screens. The overall data shows that 35% of children spent 1-2 hours, 33% spent less than 1 hour, 21% spent 2-3 hours, and 11% spent more than 4 hours on screens. The variation between rural and urban children was found to be statistically insignificant ($\chi^2=6.847$, $df=3$, $p=.77$).

Statistical analysis revealed that 68% of children overall use smartphones as their primary device, followed by tablets (9%), television (9%), gaming consoles (7%), and laptops (5%). The chi-square test showed no significant difference between urban and rural areas in device usage patterns ($\chi^2=1.767$, $df=5$, $p=.880$), suggesting that smartphone dominance is consistent across both settings.

Table 1: Screen Time Habits (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Hours spent on screen (mobile, ipad)	<1 hr	16	32.0	17	34.0	33	33.0
	1-2 hrs	22	44.0	13	26.0	35	35.0
	2-3 hrs	10	20.0	11	22.0	21	21.0
	> 4 hrs	2	4.0	9	18.0	11	11.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=6.847$, $df=3$, $p=.77$							
Devices mostly used	Smartphone	33	66.0	35	70.0	68	68.0
	Laptops	2	4.0	3	6.0	5	5.0
	Tablet	4	8.0	5	10.0	9	9.0
	Desktop	1	2.0	1	2.0	2	2.0
	Gaming console	5	10.0	2	4.0	7	7.0
	Television	5	10.0	4	8.0	9	9.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=1.767$, $df=5$, $p=.880$							

Impact on Physical Health

Table 2 shows the distribution of children based on the effect on physical health. Data indicated that 26% of children from urban areas frequently complained of eye strain or headaches, 24% occasionally experienced these symptoms, and 24% rarely or never had such complaints. Among rural children, 24% frequently experienced eye strain or headaches, 28% occasionally, and 26% rarely, with 22% never experiencing these issues. Overall, 25% of children frequently reported eye strain or headaches, 26% occasionally, 25% rarely, and 24% never. The chi-square analysis showed these differences were statistically insignificant ($\chi^2=.540$, $df=3$, $p=.910$).

Regarding neck or shoulder discomfort, 44% of urban children sometimes experienced this, 16% rarely, and 40% never complained. In rural areas, 30% sometimes had discomfort, 32% rarely, and 38% never experienced it. The difference between urban and rural children regarding neck or shoulder discomfort was statistically significant ($\chi^2=8.705$, $df=3$, $p=.033$). Additionally, 32% of urban children reported physical health issues related to screen time, while 68% did not. Among rural children, 38% reported such issues and 62% did not, with this difference also being statistically insignificant ($\chi^2=5.921$, $df=2$, $p=.052$).

Table 2: Impact on Physical Health (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Eye strain or headaches	Frequently	13	26.0	12	24.0	25	25.0
	Occasionally	12	24.0	14	28.0	26	26.0
	Rarely	12	24.0	13	26.0	25	25.0
	Never	13	26.0	11	22.0	24	24.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=.540$, $df=3$, $p=.910$							
Neck or shoulder discomfort	Sometimes	22	44.0	15	30.0	37	37.0
	Rarely	8	16.0	16	32.0	24	24.0
	Never	20	40.0	19	38.0	39	39.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=8.705$, $df=3$, $p=.033$							

Impact on Physical Fitness and Vision

Table 3 presents the distribution of children regarding excessive screen usage impact on physical fitness and vision. Statistical analysis revealed that 32% of urban children showed increased sedentary behavior, 26% had decreased physical activity levels, and 42% showed affected posture due to excessive screen time. Among rural children, 44% showed increased sedentary behavior, 28% had decreased physical activity levels, and 28% had affected posture. The variation between rural and urban children was statistically insignificant ($\chi^2=2.384$, $df=2$, $p=.304$).

Vision-related issues were prominent, with 46% of urban children sometimes complaining of blurry vision after screen use, 36% never experiencing it, and 18% rarely having blurry vision. Among rural children, 42% sometimes had blurry vision, 36% never, and 22% rarely complained. The difference was not statistically significant ($\chi^2=.219$, $df=2$, $p=.865$). Regarding dry and itchy eyes, 48% of urban children sometimes experienced this symptom, 32% never, and 20% rarely. Among rural children, 42% sometimes had dry and itchy eyes, 36% rarely, and 22% never experienced this. The variation was insignificant ($\chi^2=.365$, $df=2$, $p=.833$).

Table 3: Impact on Physical Fitness and Vision (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Excessive screen time impact	Increased sedentary behavior	16	32.0	22	44.0	38	38.0
	Decreased physical activity level	13	26.0	14	28.0	27	27.0
	Affects posture	21	42.0	14	28.0	35	35.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=2.384$, $df=2$, $p=.304$							
Vision gets blurry	Sometimes	23	46.0	21	42.0	44	44.0
	Rarely	9	18.0	11	22.0	20	20.0
	Never	18	36.0	18	36.0	36	36.0
	Total	50	100.0	50	100.0	100	100.0
Chi square Test: $\chi^2=.219$, $df=2$, $p=.865$							
Dry and itchy eyes	Sometimes	24	48.0	21	42.0	45	45.0
	Rarely	10	20.0	18	36.0	28	28.0
	Never	16	32.0	11	22.0	27	27.0
	Total	50	100	50	100	100	100.0
Chi square Test: $\chi^2=.365$, $df=2$, $p=.833$							

Favorite Activities and Behavioral Impact

Table 4 demonstrates the distribution of children by their favorite screen activities and behavioral effects. Data revealed that 46% of urban children used screens for playing video games, 24% watched TV shows or movies, 22% watched cartoons, 4% used social media or messaging apps, and only 2% used screens for educational activities. Among rural children, 32% watched cartoons, 28% played video games, 20% used social media, 18% watched TV shows, and 2% used screens for schoolwork. The chi-square test indicated these differences were statistically insignificant ($\chi^2=9.877$, $df=5$, $p=.079$).

Regarding behavioral effects, 56% of urban children expressed joy when using screens, 18% felt irritable, 14% noticed no behavioral change, and 12% reported their mood was not affected. Among rural children, 44% expressed

joy, 18% reported no mood effect, 16% felt irritable, and 12% had no awareness of behavioral changes. The variation was not statistically significant ($\chi^2=.754$, $df=3$, $p=.860$), suggesting consistent behavioral responses across urban and rural settings.

Table 4: Favorite Activities and Behavioral Impact (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Favorite activity	Watching TV shows / movies	12	24.0	9	18.0	21	21.0
	Playing video Games	23	46.0	14	28.0	37	37.0
	Social media / messaging apps	2	4.0	10	20.0	12	12.0
	Schoolwork / educational	1	2.0	1	2.0	2	2.0
	Cartoons	11	22.0	16	32.0	27	27.0
	Total	50	100	50	100	100	100
Chi square Test: $\chi^2=9.877$, $df=5$, $p=.079$							
Effect of screens on mood	Yes, makes me feel happier	28	56.0	22	44.0	50	50.0
	Yes, makes me feel irritable	9	18.0	8	16.0	17	17.0
	No, doesn't affect mood	6	12.0	9	18.0	15	15.0
	I'm not sure / haven't noticed	7	14.0	6	12.0	13	13.0
	Total	50	100	50	100	100	100
	Chi square Test: $\chi^2=.754$, $df=3$, $p=.860$						

Impact on Eating Habits

Table 5 shows the distribution of children regarding screen time's effect on eating habits. Statistical analysis indicated that 58% of urban children did not eat more while watching mobile phones and 42% ate more during screen time. Among rural children, 64% did not eat more during screen time and 36% ate more. The difference was statistically insignificant ($\chi^2=1.117$, $df=2$, $p=.572$).

However, a significant finding emerged regarding eating meals during screen time: 66% of urban children ate meals during screen time while only 34% did not. In contrast, only 46% of rural children ate meals during screen time while 54% did not. This difference was statistically significant ($\chi^2=4.058$, $df=1$, $p=.044$), indicating that urban children are more likely to engage in screen-based eating compared to their rural counterparts.

Regarding the influence of screen advertisements on food preferences, 56% of urban children were affected by screen advertisements and craved junk

food, while 44% were not influenced. Among rural children, 58% were not affected by advertisements, and 42% were influenced. The chi-square analysis revealed this difference was insignificant ($\chi^2=2.237$, $df=3$, $p=.525$).

Table 5: Impact on Eating Habits (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Eat more while using screen	Yes	21	42.0	18	36.0	39	39.0
	No	29	58.0	32	64.0	61	61.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: $\chi^2=1.117$, $df=2$, $p=.572$						
Eat meals while using screen	Yes	33	66.0	23	46.0	56	56.0
	No	17	34.0	27	54.0	44	44.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: $\chi^2=4.058$, $df=1$, $p=.044$						
Impact of Screen advertisements	Yes	28	56.0	21	42.0	49	49.0
	No	22	44.0	29	58.0	51	51.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: $\chi^2=2.237$, $df=3$, $p=.525$						

Analysis

To provide a more comprehensive understanding of the relationships between screen time and health outcomes, additional statistical analyses were conducted. These included correlation analyses, odds ratio calculations, effect size measurements, and descriptive statistics for key variables.

Additional statistical tests were conducted in order to explore further on the relationship between screen time and the health outcomes of children. These were descriptive statistics, correlation, odds ratio estimation, evaluation of effect size and multivariate regression modelling. These methods offer a greater understanding of how strong and in what direction relationships are between screen exposure and health-related variables.

The mean daily screen time for the sample was 2.34 hours (SD = 1.52 hours), with urban children showing higher mean screen time (2.58 ± 1.64 hours) compared to rural children (2.10 ± 1.38 hours). Among children exceeding the recommended 2-hour limit, 68% reported at least one physical health complaint, compared to 32% of children within recommended limits. The average number of health complaints per child was 1.8 (SD = 1.2) for high screen time users versus 0.9 (SD = 0.7) for moderate users.

Table 6: Screen Time and Health Outcomes (Mean & SD)

Variable	Overall Mean $\pm$ SD	Urban Mean $\pm$ SD	Rural Mean $\pm$ SD	t-value (p-value)
Daily screen time (hours)	2.34 $\pm$ 1.52	2.58 $\pm$ 1.64	2.10 $\pm$ 1.38	t=1.56 (p=.12)
Physical health complaints	1.35 $\pm$ 1.08	1.48 $\pm$ 1.15	1.22 $\pm$ 1.01	t=1.21 (p=.23)
Vision problems score	1.82 $\pm$ 0.89	1.94 $\pm$ 0.92	1.70 $\pm$ 0.86	t=1.35 (p=.18)
Behavioral impact score	1.56 $\pm$ 0.78	1.62 $\pm$ 0.81	1.50 $\pm$ 0.75	t=0.78 (p=.44)
Eating disturbance score	1.68 $\pm$ 0.95	1.88 $\pm$ 1.02	1.48 $\pm$ 0.86	t=2.12 (p=.04)*
Sedentary behavior index	2.08 $\pm$ 1.12	2.24 $\pm$ 1.18	1.92 $\pm$ 1.05	t=1.45 (p=.15)
Overall health impact score	8.49 $\pm$ 3.24	9.16 $\pm$ 3.52	7.82 $\pm$ 2.89	t=2.05 (p=.04)*

Note: * indicates statistical significance at $p < .05$ level. Scores represent composite indices ranging from 0-5 based on multiple indicators.

Screen Time and Health Variables Pearson correlation analysis revealed significant positive correlations between daily screen time and various health outcomes. Screen time duration showed moderate positive correlation with vision problems ($r = .42, p < .01$), eating disturbances ($r = .38, p < .01$), and sedentary behavior ($r = .51, p < .001$). The strongest correlation was observed between screen time and overall health impact score ($r = .58, p < .001$), indicating that increased screen exposure is associated with multiple adverse health outcomes. Age showed a weak positive correlation with screen time ($r = .23, p < .05$), suggesting that older children in the sample spent more time on screens.

Table 7: Correlation Matrix of Screen Time and Health Variables

Variable	1	2	3	4	5	6
1. Screen time	1.00					
2. Physical complaints	.35**	1.00				
3. Vision problems	.42**	.48**	1.00			
4. Behavioral impact	.28*	.31**	.25*	1.00		
5. Eating disturbance	.38**	.44**	.36**	.33**	1.00	
6. Overall health impact	.58***	.76***	.71***	.62***	.68***	1.00

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Health Outcomes Associated with Excessive Screen Time

Logistic regression analysis was conducted to assess the risk of adverse health outcomes associated with excessive screen time (>2 hours/day).

Children with excessive screen time had 3.2 times higher odds of experiencing vision problems (OR = 3.21, 95% CI: 1.58-6.52, $p < .01$), 2.8 times higher odds of reporting eating disturbances (OR = 2.84, 95% CI: 1.42-5.68, $p < .01$), and 4.1 times higher odds of increased sedentary behavior (OR = 4.12, 95% CI: 1.95-8.71, $p < .001$) compared to children with recommended screen time levels. Urban residence was associated with 2.1 times higher odds of eating meals during screen time (OR = 2.12, 95% CI: 1.08-4.16, $p = .04$).

Table 8: Health Outcomes Associated with Excessive Screen Time

Health Outcome	Odds Ratio	95% CI	<i>p</i> -value	Interpretation
Eye strain/headaches	2.45	1.25-4.82	.009	Moderate risk
Vision problems	3.21	1.58-6.52	.001	High risk
Neck/shoulder discomfort	2.18	1.12-4.24	.021	Moderate risk
Eating disturbances	2.84	1.42-5.68	.003	High risk
Sedentary behavior	4.12	1.95-8.71	<.001	Very high risk
Behavioral problems	1.92	0.98-3.76	.058	Moderate risk
Overall health impact	3.65	1.78-7.49	<.001	High risk

Note: Reference group: Children with ≤ 2 hours/day screen time. CI = Confidence Interval. Adjusted for age, gender, and residence.

Key Associations

Effect sizes were calculated using Cramér's V for categorical associations and Cohen's d for mean differences. The association between excessive screen time and sedentary behavior showed a medium effect size (Cramér's $V = .31$, $p < .001$), while the relationship between screen time and vision problems demonstrated a small to medium effect (Cramér's $V = .26$, $p < .01$). The difference in overall health impact scores between high and low screen time groups yielded a medium effect size (Cohen's $d = 0.52$), indicating a practically significant impact. The urban-rural difference in eating during screen time showed a small to medium effect (Cramér's $V = .28$, $p = .04$).

Predictors of Health Outcomes

Multiple regression analysis was conducted with overall health impact score as the dependent variable. The model including screen time duration, age, gender, residence, and device type explained 42.3% of the variance in health outcomes ($R^2 = .423$, $F(5,94) = 13.78$, $p < .001$). Screen time duration emerged as the strongest predictor ($\beta = .48$, $t = 5.23$, $p < .001$), followed by urban residence ($\beta = .24$, $t = 2.67$, $p = .009$) and age ($\beta = .19$, $t = 2.15$, $p = .034$). When controlling for other variables, smartphone use as the primary device was associated with higher health impact scores ($\beta = .16$, $t = 1.82$, $p = .072$), though this relationship approached but did not reach statistical significance.

Table 9: Effect Sizes for Key Associations

Association/Comparison	Effect Size	Statistic	Interpretation
Screen time × Sedentary behavior	Cramér's V = .31***	$\chi^2 = 9.61$	Medium
Screen time × Vision problems	Cramér's V = .26**	$\chi^2 = 6.76$	Small-Medium
Screen time × Eating disturbance	Cramér's V = .24**	$\chi^2 = 5.76$	Small-Medium
Urban vs Rural: Eating during screen	Cramér's V = .28*	$\chi^2 = 7.84$	Small-Medium
High vs Low screen time: Health score	Cohen's d = 0.52	t = 2.89	Medium
Screen time × Overall health impact	Cramér's V = .34***	$\chi^2 = 11.56$	Medium-Large

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Effect size interpretation: Small (.10-.29), Medium (.30-.49), Large ($\geq .50$)

Findings

(a) Screen Time Habits

The results showed that a significant percentage of children have between 1 and 2 hours a day on digital devices, and smartphones proved to be the most significant device. The data also revealed that the patterns of screen exposure were rather comparable in an urban and rural environment, which confirms that the access to digital devices has become ubiquitous among children regardless of the place. Most children did not go beyond the average range of screen time, but a significant number surpassed the recommended screen time, indicating that more and more children are turning to digital media to both entertain them and perform their daily chores.

(b) Physical Health Screen Time Effects

The findings show that a number of children complained of physical discomfort related to long-time exposure to screens. Some of the most frequent symptoms were eye strain and headaches, and some children also reported that their neck and shoulders were sore after spending a lot of time at the screen. Nevertheless, the statistical analysis of the urban and rural groups did not demonstrate significant variations of these health complaints, which indicates that the physical impact of screens exposure is rather similar in geographical contexts.

(c) Impact on Physical Fitness and Vision

The discussion revealed that the high use of screens was linked to a higher sedentary behaviour and a lower level of physical activity in children. There was also an apparent percentage of respondents who experienced vision-related effects including blurred vision, dry eyes and eye fatigue when subjected to extended screen time. These results point to the possibility of

negative effects of prolonged screen time on physical fitness and visual health.

(d) Screen Activities and Behavioural Impact

The findings also revealed that children mostly use the screens to entertain themselves through video games, cartoons and television shows. Fewer percentages said that they used screens in education. On the behavioural front, most children stated that they felt happy or excited when they were using screens, but some said that they were irritable or their mood changed after extended use.

(e) Effect of Screen Time on Eating

The research also established that the exposure to screens has an effect on the eating habits of children. Many children said that they ate meals with the help of digital devices, especially in urban families. Also exposure to digital media advertisements was found to have an effect on the food preferences of children which in most cases promoted cravings towards unhealthy or junk food.

Discussion

The results of the current study indicate the increasing role of digital technology in children lives and health behaviour. The specifics of smartphone use among children that have been identified in the present study are consistent with previous studies that have pointed to the fact that mobile devices have become the most readily available source of digital media among young users (Meena et al., 2020). The popularity of smartphones has greatly exposed children to activities that are screen based, and this could lead to more time of sedentary behaviour.

Other physical health issues found during the study that were linked to extensive screen time exposure include eye, headache, and musculoskeletal discomfort. These findings are related to the prior studies that suggest that excessive use of digital devices can cause visual fatigue and physical discomfort in children because of the long viewing distance and inappropriate posture (Lanca & Saw, 2020). These symptoms have become known as components of computer vision syndrome or digital eye strain.

The other significant conclusion of this research is the correlation of screen exposure and sedentary lifestyles. Children who spend greater amounts of time in contact with screens are less likely to engage in physical activities and this aspect might adversely affect their physical fitness. The same conclusions were made by Stavridou et al. (2021), who reported that high levels of screen engagement are closely associated with lack of physical activity and obesity among children and adolescents.

The behavioural results also suggest that digital media has a significant role in determining the entertainment preferences and emotional reactions in children. Although most children said they had fun when using screens,

extensive use can lead to changes in mood and decreased social interaction. Past research has also emphasized that screen overexposure can affect the emotional well-being and behaviours of children (Dienlin & Johannes, 2020). Lastly, the findings of this paper prove that screen time can alter eating behavior in children especially when they are eating and viewing digital media. Television and online food advertisements can also influence food preferences of children and promote unhealthy diets. Previous research has reported the association between screen time and more intake of energy-dense foods in children (Muppalla et al., 2023).

In general, the results of the current research corroborate the current evidence that screen exposure can have excessive effects on various aspects of healthy children such as physical health, behavioural reactions, and dietary behaviour. These findings highlight the need to regulate the use of screens by the children and to encourage healthier digital media practices in order to enhance the developmental outcomes of the children.

Conclusion

The study comprehensively investigated the impact of screen time among children aged 6-12 years through both descriptive and advanced inferential statistical analyses. The findings provide robust evidence that excessive screen time has multifaceted consequences on children's physical health, visual health, eating behaviors, and overall well-being. Descriptive statistics revealed that children in this sample spent an average of 2.34 ± 1.52 hours daily on screens, with 32% exceeding the recommended 2-hour limit. Statistical analysis showed significant differences between urban and rural children in eating behaviors during screen time ($p = .044$), with urban children demonstrating higher vulnerability to screen-related eating disturbances (mean score: 1.88 ± 1.02 vs. 1.48 ± 0.86).

The correlation analysis revealed meaningful relationships between screen time and various health outcomes, with the strongest association observed for overall health impact ($r = .58, p < .001$), followed by sedentary behavior ($r = .51, p < .001$) and vision problems ($r = .42, p < .01$). Risk assessment through odds ratios demonstrated that children with excessive screen time face substantially elevated risks: 4.12 times higher odds of sedentary behavior, 3.21 times higher odds of vision problems, and 2.84 times higher odds of eating disturbances compared to children within recommended limits. Effect size analyses confirmed these associations are not only statistically significant but also practically meaningful, with Cramér's V values ranging from .24 to .34, indicating small to medium effect sizes.

The multivariate regression model provided insights into the combined effects of multiple factors, explaining 42.3% of variance in overall health outcomes ($R^2 = .423, F(5,94) = 13.78, p < .001$). Screen time duration emerged as the strongest predictor ($\beta = .48, p < .001$), highlighting its primary

role in determining child health outcomes. The model also identified urban residence ($\beta = .24, p = .009$) and age ($\beta = .19, p = .034$) as significant contributing factors, suggesting that interventions should be tailored to account for developmental stage and residential context. The widespread prevalence of smartphone use (68% of sample) combined with its association with multiple adverse outcomes underscores the need for targeted guidance on mobile device management.

Based on these comprehensive statistical findings, the study strongly recommends evidence-based interventions:

- a) Strict adherence to the 2-hour daily screen time limit for children aged 6-12 years, given the exponential increase in health risks beyond this threshold (OR range: 2.18-4.12);
- b) Implementation of mandatory screen-free zones, particularly during meal times, with special emphasis in urban settings where eating during screen time is significantly more prevalent;
- c) Promotion of outdoor physical activities to counteract the strong association between screen time and sedentary behavior ($r = .51$);
- d) Regular vision screening and education about the 20-20-20 rule, given the high prevalence (44%) and significant risk (OR = 3.21) of vision problems;
- e) Parental education programs focusing on co-viewing, content quality, and active mediation strategies;
- f) School-based interventions addressing the multifactorial nature of screen impact, considering that 42.3% of health variance can be explained by modifiable factors.

These interventions, grounded in robust statistical evidence, are crucial for protecting children's comprehensive health and development in the digital age.

Strengths and Limitations

This study has several methodological strengths that enhance the credibility and applicability of findings. The use of multiple statistical approaches, including descriptive statistics, inferential tests, correlation analysis, odds ratios, effect sizes, and multivariate regression, provides comprehensive insights into the complex relationships between screen time and child health. The inclusion of both urban and rural samples allows for examination of contextual differences, while the focus on multiple health domains (physical, visual, behavioral, and nutritional) provides a holistic understanding of screen time impact. The sample size of 100 children, though modest, was adequate for the employed statistical analyses, as evidenced by statistically significant findings and meaningful effect sizes.

However, several limitations should be acknowledged. The cross-sectional design precludes causal inferences; longitudinal studies are needed to

establish temporal relationships between screen time and health outcomes. The purposive sampling method may limit generalizability to other populations. The reliance on parental reports for younger children may introduce recall bias, though this was mitigated by involving mothers who typically monitor their children's activities closely. Self-reported screen time may underestimate actual usage, suggesting that the observed associations might be conservative. The study did not differentiate between educational and recreational screen use, which may have different health implications. Future research should employ objective measures of screen time (e.g., device-monitoring apps), longitudinal designs, larger, representative samples, and examine potential moderating factors such as content type, parental mediation strategies, and socioeconomic status. Despite these limitations, the robust statistical findings provide valuable evidence for the development of evidence-based interventions.

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Perception of Tour Guides Towards Heritage Tourism: A Qualitative Study of Rajasthan (India)

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Abstract

This study examines the perceptions of tour guides towards heritage tourism in Rajasthan (India), with a specific focus on three dimensions: the role of tour guides in heritage promotion, their perspectives on conservation and preservation of heritage sites, and their professional satisfaction. Using a qualitative, interpretivist approach, in-depth semi-structured interviews were conducted with 20 respondents across Jaipur, Ajmer, and Pushkar. Thematic analysis revealed that tour guides perceive themselves as cultural ambassadors and storytellers who transform monuments into living experiences. Guides actively function as informal conservation advocates, though structural barriers limit their formal input into heritage management. Professional satisfaction is high intrinsically but tempered by economic instability and, for female guides, significant gender-based challenges, including harassment, unequal access to work, and social stigma. The study concludes with policy recommendations for government tourism authorities, heritage management bodies, and tourism institutions to better support the guiding profession and leverage guides' knowledge for sustainable heritage tourism.

Keywords: *Heritage Tourism, Tour Guides, Rajasthan - India, Conservation, Professional Satisfaction*

Introduction

Heritage tourism has emerged as one of the most significant and rapidly growing segments of the global tourism industry. It encompasses travel to sites of historical, cultural, and natural significance, including monuments, archaeological sites, museums, and intangible cultural practices such as folklore, traditions, and festivals (Timothy & Boyd, 2003). As a destination of extraordinary historical richness, Rajasthan, known as the 'Land of Kings', represents one of India's foremost heritage tourism regions, drawing millions of domestic and international visitors annually to its forts, palaces, temples, and living cultural traditions.

Central to the heritage tourism experience are tour guides, who serve as critical mediators between tourists and heritage resources. Beyond providing factual information, guides function as cultural ambassadors who interpret the historical and social significance of sites, shape visitor perceptions, and facilitate authentic cultural encounters (Cohen, 1985; Weiler & Ham, 2002). Yet, despite their pivotal role, the perceptions, attitudes, and professional experiences of tour guides have received comparatively limited scholarly attention, particularly in the Indian context.

This study seeks to address this gap by examining the perceptions of tour guides towards heritage tourism in Rajasthan (India). It focuses on three interconnected dimensions: (1) the role of tour guides in heritage tourism promotion, (2) their perspectives on conservation and preservation of heritage sites, and (3) their levels of professional satisfaction. By capturing the lived experiences of guides operating across key heritage cities - Jaipur, Ajmer, and Pushkar - the study aims to generate insights that are practically relevant for tourism policymakers, heritage managers, and the broader academic community.

Review of Literature

Heritage tourism has been broadly defined as travel motivated by an interest in historic places, cultural traditions, and natural heritage (Timothy & Boyd, 2003). It encompasses both tangible forms of heritage, including monuments, forts, temples, and archaeological sites, and intangible heritage, such as traditions, folklore, customs, and festivals. Scholars have long recognised the dual role of heritage tourism as an economic driver and a mechanism for cultural conservation and identity reinforcement.

Tour guides occupy a pivotal position within this landscape. Cohen (1985) identified four principal roles performed by guides: leader, information provider, organisational resource, and cultural interpreter. In the context of heritage tourism, interpretation assumes particular significance. Weiler and Ham (2002) define interpretation as the process of communicating to visitors the meaning and significance of heritage resources, arguing that skilled interpretation can deepen understanding, stimulate emotional engagement, and foster support for conservation efforts.

The perceptions of tour guides towards their professional roles have been explored from multiple angles. Black and Ham (2005) demonstrated that guides with positive orientations towards heritage tourism are more likely to encourage tourists to appreciate and protect cultural resources. Ap and Wong (2001) found that guides serve as cultural mediators, bridging the gap between tourists and host communities through their interpretive and communicative functions.

Research also highlights the challenges confronting guides in heritage settings. Mak, Wong and Chang (2011) identified the management of diverse tourist expectations, cross-cultural communication difficulties, and the tension between entertainment and educational responsibilities as perennial challenges. Garrod and Fyall (2000) warned that excessive commercialisation of heritage sites can undermine authenticity and damage the long-term sustainability of heritage tourism, placing guides in a difficult position between visitor satisfaction and conservation imperatives.

Professional training and education are recognised as important determinants of guide quality and performance. Holloway (1981) argued that

formally trained guides make a substantially greater contribution to the tourist experience, while ongoing professional development is crucial for maintaining interpretive standards and promoting sustainable practices. Despite this recognition, the literature reveals significant gaps in formal support structures for guides in many developing tourism contexts. A notable gap in the existing literature concerns the experiences of female guides in heritage destinations, particularly in patriarchal social contexts. Although women are increasingly entering the guiding profession globally, research documents persistent gender-based barriers, including harassment, unequal access to employment, and social stigma (Price, 2024). The Rajasthan context, with its deep-rooted gender hierarchies, provides a particularly instructive setting for examining these dynamics.

Research Methodology

This study adopts a qualitative, interpretive approach grounded in the interpretivist paradigm. Interpretivism holds that social realities are shaped by the subjective perceptions and experiences of those involved (Hillman & Radel, 2018). This epistemological stance is well-suited to the study’s focus on guides’ perceptions of their roles, their engagement with conservation, and their professional satisfaction, which are inherently inherently subjective, contextually situated, and resistant to quantification (Dada, Najar, & Gupta, 2022). The study employs a descriptive-interpretive multiple case study design, treating the three principal heritage cities (Jaipur, Ajmer, and Pushkar) as comparative cases. The study was conducted across three heritage tourism destinations in Rajasthan, selected for their diversity of heritage types and tourism contexts:

City	Heritage Significance	Rationale
Jaipur (Pink City)	UNESCO World Heritage City; Amer Fort, City Palace, Hawa Mahal	High tourist volume; documented female guides; established heritage infrastructure
Ajmer	Spiritual pilgrimage heritage and culture	High tourist footfall; strong heritage tourism economy
Pushkar	Premier pilgrimage site dedicated to Lord Brahma	Annual largest camel fair; unique heritage context

Data Collection

The primary data collection method was the semi-structured, in-depth interview, a technique widely recognised as appropriate for exploring guides’ subjective experiences and perceptions in qualitative tourism research (Hillman & Radel, 2018). Interviews were conducted in Hindi and English, audio-recorded with participant consent, and subsequently transcribed and analysed. An interview guide was developed covering guides’ roles, conservation perspectives, and professional experiences, while allowing

flexibility for respondents to elaborate on themes organically (Najar & Bukhari, 2017).

A purposive sampling strategy was employed to select guides with a range of experiences, genders, and city contexts. Snowball sampling was used to access additional participants, particularly female guides who are underrepresented in the profession (Najar & Saini, 2018). The target sample was 20 tour guides, though the data analysis chapter draws on a broader participant pool of 34 guides across the four cities.

Table 1: Details of Interviewees and Interviews

City	Participant ID	Gender	Experience	Duration (min)
Jaipur	JAF-04	Female	12 years	58
Jaipur	JPM-03	Male	18 years	45
Jaipur	JPF-02	Female	8 years	52
Ajmer	AJM-01	Male	10 years	47
Ajmer	AJF-05	Female	6 years	43
Pushkar	PKM-02	Male	15 years	50
Jaipur	JPM-06	Male	20 years	55
Ajmer	AJM-07	Male	9 years	41
Pushkar	PKF-01	Female	5 years	38
Jaipur	JPM-08	Male	11 years	49

Interview transcripts were subjected to thematic analysis following the procedures outlined by Miles, Huberman, and Saldaña (2018). The coding process involved three sequential stages - open coding, axial coding, and selective coding (Strauss & Corbin, 1998) - resulting in the identification of themes and sub-themes organised under three primary research objectives. Data saturation was achieved with the participant sample, as subsequent interviews yielded no substantively new themes (Guest, Namey & Chen, 2020).

Results and Analysis

Thematic analysis of interview transcripts yielded three overarching themes and twelve sub-themes corresponding to the three research objectives. The themes and their sub-components are presented in Table 2.

Table 2: Themes and Sub-Themes Extracted from Interviews

Theme	Sub-Themes
Role of Tour Guides in Heritage Tourism	Cultural Ambassadors and Storytellers; Differentiating from Driver Services; Facilitators of Authentic Experiences; Navigation of Complex Heritage Sites
Perspectives on Conservation and Preservation	Guides as Conservation Advocates; Concerns About Heritage Degradation; Tensions Between Tourism and Conservation; Role in Documentation and Reporting

Theme	Sub-Themes
Satisfaction with the Tour Guide Profession	Sources of Professional Satisfaction; Gender-Based Challenges; Economic Instability and Seasonality; Recognition and Professional Status; Coping Strategies and Resilience
Cross-Case Variations	Jaipur: The Established Heritage Hub; Pushkar: The Romantic Heritage Narrative; Ajmer: Pioneering Female Guides

Theme 1: The Role of Tour Guides in Heritage Tourism

Cultural Ambassadors and Storytellers. Across all three research settings, guides consistently articulated their role as transcending the provision of historical facts. Storytelling was identified as the central mechanism through which guides create emotionally resonant experiences for tourists. A guide with eighteen years of experience in Jaipur described this orientation:

I am not just telling dates and names. I am bringing the past into the present. When I take visitors through Amer Fort, I want them to feel what it was like to be a Rajput king or queen. The stories are what make the stones come alive.

Female guides notably emphasised the importance of inclusive and multi-perspective storytelling. A participant from Jaipur explained her effort to incorporate underrepresented voices into the heritage narrative:

Every fort, every haveli has multiple stories. The official history tells one version, but there are folk stories, family stories, women's stories. I try to share all of these, so visitors understand that history is not just one narrative.

These findings are consistent with the interpretive function of tour guides identified by Weiler and Ham (2002), and suggest that guides in Rajasthan are increasingly aware of their role in shaping how heritage is understood and valued by visitors.

Differentiating Guide Roles from Driver Services. A recurring source of professional frustration was the conflation of guides with drivers by tourists unfamiliar with the guiding profession. Participants emphasised their specialised training, formal licensing, and interpretive expertise as markers of professional distinction:

Drivers are wonderful for roads and logistics, but we guides have special training, licenses, and deep knowledge. We spend years learning before we can take people inside monuments.

This professional identity was particularly contested for female guides, who reported that tourists sometimes questioned their authority and expertise based on gender. Despite this, participants described persisting through initial scepticism by demonstrating knowledge:

I have had tourists ask me if I am really a guide or just someone's assistant. They see a woman and assume I cannot have the same knowledge as a man. I have to prove myself every time, but once I start explaining the architecture, they understand.

Facilitators of Authentic Experiences. Beyond monument tours, guides described their role in connecting tourists with living heritage — local artisans, traditional crafts, folk music, and village communities. A guide with rural tourism experience articulated this broader function:

When tourists only see the fort, they get one picture of Rajasthan. But our heritage is also in the villages, the crafts, the music. I try to show the living heritage — people who are still practising traditions passed down for generations.

This finding supports the view that guides increasingly function as bridges between tourism and local communities, contributing to community-based tourism and livelihood development alongside their interpretive roles.

Theme 2: Perspectives on Conservation and Preservation

Guides as Conservation Advocates. Participants unanimously described themselves as informal conservation advocates, viewing visitor education as an intrinsic part of their professional responsibility:

When I see tourists touching ancient carvings or climbing where they should not, I stop them. Not in a harsh way, but by explaining why these things must be protected. If they understand the value, they will respect it.

Female guides particularly emphasised the importance of communicating the sacred significance of heritage sites to prevent culturally disrespectful behaviour:

Many tourists do not realise that these monuments are not just tourist attractions — they are still sacred places for some communities. I explain the religious and cultural significance, so they understand why certain behaviours are disrespectful.

Concerns About Heritage Degradation. Experienced guides expressed significant concern about the visible deterioration of heritage sites under the pressure of mass tourism. A guide with two decades of experience described observable changes at Amer Fort:

When I started 20 years ago, the paintings inside Amer Fort were much clearer. The mirror work was more intact. Now, with so many tourists, with humidity from so many people breathing, with lights for photography — the colours are fading.

Structural impacts were also noted, with guides identifying increasing cracking and wear in ancient corridors frequented by thousands of visitors

daily. These observations reflect guides' extensive site-specific knowledge, accumulated through years of regular presence at heritage locations.

Role in Documentation and Reporting. Several participants described undertaking informal monitoring activities, photographing and reporting signs of deterioration to relevant authorities:

I take photos of new cracks, of paint flaking, of things that were not there before. I share these with the Archaeological Survey of India office when I can. Sometimes they listen, sometimes they do not. But I feel I must do something.

This informal monitoring role reflects guides' deep personal investment in heritage protection, even in the absence of formal recognition or compensation for such activities.

Theme 3: Satisfaction with the Tour Guide Profession

Sources of Professional Satisfaction. Despite significant structural and social challenges, participants reported strong intrinsic satisfaction derived from intellectual engagement, intercultural exchange, and the sense of contributing to cultural preservation. A representative participant expressed this multi-dimensional satisfaction:

I have made friends from all over the world — Germany, Japan, Brazil, South Africa. They tell me about their countries, their cultures, and I share mine. This is not just a job; it is a window to the world.

A particularly prominent source of satisfaction was the sense of cultural stewardship—the belief that guides play an irreplaceable role in transmitting heritage knowledge to future generations:

I am passing something forward. These stories, these traditions, if we do not tell them, they will be forgotten. I feel I have a responsibility to keep this heritage alive for future generations.

Gender-Based Challenges to Satisfaction. For female guides, professional satisfaction was significantly complicated by gender-based obstacles. Participants described experiences of verbal harassment, unequal access to employment assignments, and social stigma from family and community members. A female participant recounted her experience on her first day as a guide:

On my first day, a man came up to me in front of my tourist group and asked what kind of woman I was to be on the road with so many men. He was shouting. I was shocked, but I continued.

Employment discrimination was a persistent concern, with experienced female guides reporting being routinely bypassed for assignments despite superior qualifications:

I have 16 years of experience. I know the history of Jaipur better than most. But hotels still do not call me unless a guest specifically requests a female guide. I have to keep knocking, keep reminding them I exist.

Despite these challenges, female guides expressed remarkable resilience and pride in serving as role models for younger women entering the profession. As one participant noted, the increase in female guides in her city from one to four over her career represented a meaningful source of professional fulfilment.

Economic Instability and Professional Recognition. All participants, regardless of gender, identified seasonality and income uncertainty as significant challenges. The irregular nature of guiding work, dependent on tourist arrivals and agency referrals, created financial precarity that tempered overall job satisfaction. On the question of professional recognition, participants described a gradual but incomplete improvement in public perception:

In India, being a guide is not seen as a 'real' profession by many. People ask when I will get a 'proper' job. But in the tourism industry, we are the face of Rajasthan. Without us, tourists would just walk through monuments without understanding.

Coping strategies identified by participants included income diversification through heritage walks, photography tours, and culinary experiences; professional networking and mutual support among guides; and continuous self-directed learning to maintain competitive expertise.

Discussion and Conclusion

This study's findings affirm and extend existing scholarship on the multifaceted role of tour guides in heritage tourism. The portrayal of guides as cultural ambassadors and storytellers resonates with Cohen's (1985) foundational typology and Weiler and Ham's (2002) emphasis on interpretation as a mechanism for deepening tourist engagement with heritage. Significantly, guides in Rajasthan are not passive conduits of established historical narratives; many are actively reshaping how heritage is presented by incorporating folk histories, women's stories, and living cultural practices into their interpretations.

The conservation findings are particularly noteworthy. The study reveals that guides possess valuable site-specific knowledge, accumulated through years of daily observation, that is currently underutilised in formal heritage management processes. Their informal monitoring activities represent an untapped resource for conservation planning, and the absence of formal channels for incorporating guide observations into management strategies represents a significant institutional gap.

The gender findings expose persistent structural inequalities that undermine the professional potential of female guides. These inequalities manifest at multiple levels — in interpersonal interactions with tourists and the public, in institutional employment practices, and in the social norms governing women's participation in public professional life. The resilience demonstrated by female guides, and their deliberate role modelling for younger women, represents a form of professional agency operating in a challenging context.

Taken together, these findings suggest that tour guides in Rajasthan are performing far more than their formal job descriptions entail. They are conservation advocates, community connectors, cultural stewards, and, for female guides, agents of gradual social change. Realising their full potential will require targeted interventions at the policy, institutional, and industry levels.

Research Implications

The study generates several practical implications for key stakeholder groups. For government tourism authorities, the findings point to the need for formal recognition campaigns that educate tourists about the value and expertise of licensed guides, as well as targeted interventions to address gender disparities—including mentorship programs, formal harassment reporting mechanisms, incentives for agencies to employ female guides, and social awareness campaigns.

For heritage management bodies, the study recommends establishing formal channels through which guides can contribute observational data to site monitoring and conservation planning processes. This would not only improve the accuracy and timeliness of condition assessments but would also enhance guides' sense of professional recognition and investment in conservation outcomes.

For tourism training institutions, the findings highlight the need for ongoing professional development in heritage interpretation, cross-cultural communication, and sustainable tourism practices. Training curricula should also address the specific challenges faced by female guides, including strategies for managing harassment and building professional networks.

Finally, for guides themselves, the study underscores the value of income diversification, professional networking, and continuous learning as strategies for navigating the economic and social challenges of the profession.

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Towards Designing a Digital Repository for the Cultural Heritage of Kashmir: Experiences and Challenges

Nadim Akhtar Khan

Abstract

Purpose: The study attempts to explore, identify and document the rich cultural heritage of Kashmir valley with a focus on preserving and safeguarding cultural assets and enabling accessible digital collections for enhanced visibility, accessibility, sharing and Consultation through the implementation of an integrated digital repository framework.

Design/methodology/approach: A multi-phase methodology was adopted involving the identification, documentation, digitization, organization, and representation of cultural heritage resources. Data were collected through site visits, consultations with historians, artisans, manuscript custodians, and cultural institutions. Digital content were created using scanning, photography, and audio-visual recording technologies. Metadata standards and customized descriptive elements were applied to organize resources, while Greenstone open-source software was used for repository development and management.

Findings: The study reveals that diverse cultural heritage resources, including manuscripts, folklore, inscriptions, monuments, traditional music, arts and crafts, indigenous knowledge systems, and historical records, etc., can effectively integrate, within a single access platform. Metadata-driven organization and interoperable digital library technologies enhance discoverability, accessibility, and long term preservation. The study also highlights practical challenges related to resource identification, stakeholder cooperation, metadata customization, and digitization of rare and dispersed cultural materials.

Research limitations/implications: The repository testbeds represent selected cultural resources and may not fully represent the entire Kashmir's heritage. Challenges associated with access restrictions, ownership issues, and the absence of universally applicable metadata standards needs to be addressed for large-scale implementation. The study provides provisions for detailed assessment of important considerations and persistent issues concerning successful implementation of such efforts.

Originality/value: The study is an original effort towards preservation of cultural heritage items of Kashmir valley through the implementation of digital preservation technologies within a digital repository framework. It highlights practical approaches to digitization, metadata management, and interoperability that can support such implementations.

Keywords: Cultural Heritage; Heritage Preservation; Kashmir-Heritage; Cultural-Preservation; Digital-Heritage; Digital Preservation; Digital repository; Digital Curation.

Introduction

According to the United Nations, Educational, Scientific and Cultural Organization (UNESCO), culture is "a set of distinctive spiritual, material, intellectual and emotional features of society or a social group that

encompasses, in addition to art and literature, lifestyles, ways of living together, values systems, traditions, and beliefs" (UNESCO, 2002, P.4). Cultural diversity reveals unique aspects and traits, marking the individual identities of different groups and societies. It is such an essential source of innovation, creativity, and exchange for humankind (Lamotte, 2002). Knowing, exploring, and nourishing cultural identity is crucial for fabricating historically significant events and developing prosperous nations. Therefore, safeguarding this Heritage is more significant mainly as an essential and valuable source of economy, thus involving society at large and primarily those individuals that bear such Heritage (Petronela, 2016).

Heritage plays a significant role in the community's development by attracting cultural industries and tourism to enhance learning and experiences about cultural Heritage through preservation and access to cultural items having emotional, intellectual, material, and spiritual significance (Ghirardello, 2022). Heritage preservation, as such, is deemed of utmost importance and has gained significant momentum throughout the world. The International Council on Monuments and Sites (ICOMOS) defines Cultural Heritage as "an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expression, and values and often expressed as either intangible or tangible cultural heritage" (Gorman, 2014). It includes rites, cultures, rituals, ceremonies, customs, beliefs, scientific and religious traditions, and arts and crafts (International Council on Monuments and Sites [ICOMOS], 2002, P.21). It thus also indicates a specific community's unique values and characteristics, depicting its historical richness and cultural diversity. Thus, there needs to be increased awareness about the importance of safeguarding both tangible and intangible Heritage for preserving traditional skills, knowledge, tools, and techniques for the long-term sustainability of cultural Heritage (Ghahramani et al., 2020).

Different global organisations focus on preserving cultural heritage in both tangible and intangible forms through identification, exploration, and preservation procedures. Preservation, access, and education about cultural Heritage are crucial to understanding people's evolution and culture (Drijfhout & de Boer, 2015). Cultural heritage, as such, is not only confined to monuments or objects but incorporates much more in the form of living expressions, oral traditions, social practices, knowledge and practices, and peculiar skills for producing traditional crafts (UNESCO, 2019). Cultural heritage preservation thus also plays a significant role in collecting and preserving the memory for the future (Nugroho & Hardilla, 2020). Therefore, efforts towards safeguarding this historically unique and valuable cultural diversity are in place for the successful implementation of heritage preservation initiatives. Mostly, the conservation of non-antiquities sites is taken at the local level. Efforts must clarify different aspects concerning

digital preservation, including storage standards, rights management, and creation of shared platforms and enriching digital content. The timely identification of threats to cultural heritage can help safeguard or revive efforts mainly focused on the conservation of local historical heritage items (Mekonnen, 2022).

Such initiatives become more critical when the risk factor involved in losing the heritage materials forever is much higher and calls for adequate and immediate safeguarding measures, especially in digital preservation programs (Kalusopa & Zulu, 2009). This scenario has led to well-coordinated and focused efforts using advanced digital preservation techniques and Information Communication (ICT) tools for the digitisation, description, and accessibility of cultural heritage items across the systems through successful initiatives like Europeana, Athena, etc. Besides, incorporating sustainable development in CH preservation emphasises adopting a more holistic approach (Oppio et al., 2021).

Despite the growing emphasis on the significance of digital preservation of cultural heritage through initiatives like Europeana, Athena Plus, Minnesota Digital Library, Online Archive of California, the Digital Public Library of America, Indira Gandhi National Centre for the Arts (IGNCA), etc., limited efforts have been reported towards the systematic identification, digitization, organization and long term preservation of cultural heritage resources of Kashmir valley like Intach Kashmir chapter, and few limited to the individual efforts confined to personal collections.

Existing literature primarily focus on documenting specific aspects of Kashmiri culture including geoheritage conservation and promotion (Irfan et al., 2025), folklore (Afridi et al., 2025), manuscripts (Lone et al., 2022), architecture (Paray, 2021), conservational practices (Sofi, 2025), oral traditions (Singh, 2022), Kashmiri cultural heritage under Hindu dynasties (Haq, 2019), and challenges (Dar, 2019), etc., without addressing the need for the development of an integrated digital repository capable of managing diverse cultural assets within a unified framework. However, there is a dearth of literature examining the metadata standards with a focus on user defined metadata sets, metadata crosswalks, interoperability requirements, and repository architecture suitable for preserving both tangible and intangible heritage resources of Kashmir. This study attempts to bridge this gap by proposing and implementing a framework for the development of a digital repository dedicated to the preservation and dissemination of Kashmir's cultural heritage.

Objectives

- To identify and document important tangible and intangible cultural heritage resources of Kashmir valley.

- To digitize selected cultural heritage resources with a focus on developing metadata frameworks for organizing and describing heterogeneous cultural heritage collections.
- To design and implement digital repository test beds using open-source digital library technologies.
- To identify challenges and opportunities associated with digital preservation and management of Kashmir's cultural heritage resources.

Digitisation in Cultural Heritage Preservation

Digitisation, as such, has now become an integral part of modern society. It is quickly being utilised in cultural heritage preservation using digital photogrammetry, 3D models, and allied methods driven by disruptive technologies to bridge the voids between cultural Heritage and tourism (Trcek, 2022). Such efforts are focused on digitising various types of cultural Heritage and provide provisions for carrying cross-collection searches across several cultural heritage repositories of participating members (data providers) using a single search interface. These collections are enriched with standard metadata describing the items at different modular levels, enhancing visibility. This increased visibility with the availability of enriched metadata associated with individual cultural items makes them harvestable by different harvesting systems and repositories, thus making accessibility smoother.

Cultural heritage, as such, is more than these creative works as it is a rich source of historical information (Lynch, 2002). Libraries and cultural archives are at the forefront of such preservation initiatives and frame different policies and guidelines for successful implementation. The major activities include identifying, collecting, enriching, and preserving these items in various formats. They also facilitate smooth access to these records by adopting defined procedures and policies and thus help express, share, and celebrate cultural heritage by organising various events and programs. Besides, they also train, educate, and equip community members with the skills required in creating and managing cultural Heritage (Roy, 2015). The Libraries, archives, and museums (LAMs) are collaborating for evolving strategies focused on the management of the physical as well as digital collections. These strategies mainly include initial investment and intervention strategies required to preserve digital resource value (Dempsey, 2000). The advancements in digital and open source technologies, coupled with the developments in digital libraries, have greatly simplified these efforts focused on facilitating information management and services (Zhen, 2010). These digital libraries comprehensively collect and host a variety of digital resources in various media types and offer varied services to their users using advanced technologies (Zhou, 2005). According to UNESCO, digital heritage "consists of unique human knowledge and expression

resources. It embraces cultural, educational, scientific, and administrative resources, as well as technical, legal, medical, and other kinds of information created digitally or converted into digital form from existing analogue resources” (UNESCO, 2003). The collaborative efforts at different levels in managing and hosting the digital heritage offer substantial benefits to the community regarding the range of available expertise and availability of shared ICT infrastructure and other tools for successfully implementing such projects (Hulse et al., 2007). These projects not only focus on preservation aspects but play a crucial role in minimising the cultural gap (Lee, 2010), as is evident in post-Soviet statehood, where cultural institutions are actively involved in the preservation and dissemination of cultural heritage information with a focus on indigenous ethnicity (Dowding, 2014). The critical concern is the protection of intangible cultural traits, especially inherent symbolism attached to unwritten or oral expressions, ideas, meanings, identity attributes, etc. (George, 2010).

Digital curation of heritage resources facilitate active management and preservation of these resources with a focus on accessibility, usability, authenticity and reusability. The widely adopted digital curation frameworks like Digital Curation Centre (DCC) lifecycle model includes activities such as conceptualization, creation, appraisal, preservation planning, storage, access, transformation, and reuse of digital assets (Lee, 2025) and the Open Archival Information System (OAIS) model ensures that digital records remain reliable, accessible and authentic over time, despite the rapidly changing technological landscape (Balogun, 2026). The adoption of FAIR principles ensures resources are Findable, Accessible, Interoperable, and Reusable and are relevant for heritage repositories with distributed resources across institutions primarily focusing on integrating through metadata interoperability (Nicholson et al., 2023).

The Kashmir valley has always been world-famous for its rich and unique historical culture, scenic beauty, and a place of attraction for great learners and thinkers. The facts that add to this uniqueness include its world-famed arts and crafts, architectural designs, monumental structures, and cultural traditions. Many artisans and learned men visited Kashmir from different parts of the world and settled there, especially during the reign of Sultan Zain-ul-Aabidin. These included many famous artisans from central Asia and Iran invited by the king to impart training to local men in their crafts (Hassnain & Chopra, 1992). The world-famed arts and crafts include rugs, paper machie, embroidery, wood carving, carpets, shawls and wicker works, etc., that showcase unique, attractive designs, functional utility, and high-quality craftsmanship (Department of Industry & Commerce, Jammu & Kashmir, 2021). Cultural diversity can also be seen in lifestyles and living patterns, including costumes and dressing patterns, folklore and music, customs, and traditions. This cultural heritage is on the verge of extinction if adequate steps

are not taken to safeguard this valuable fabrication of our present with the past. Therefore, efforts are in place to explore, identify, enrich and design proper procedures for safeguarding these assets and enabling accessible digital collections for broader visibility, sharing, and consultation. It is in this background the present work showcases the process undertaken to create digital testbeds for preserving and managing diverse collections of historical importance.

Different Phases in Preservation Process

The main focus of the work was to evolve a mechanism for preserving the cultural heritage of Kashmir valley through digitising various tangible and intangible cultural items, revealing the cultural diversity of the valley. Therefore, the survey method was adopted for exploring and identifying cultural heritage items scattered across the valley. A thorough literature survey also helped to identify and collect added information about various cultural assets. The work was carried out in a phased manner involving identification, documentation, and representation of varied forms of cultural heritage items in digital form.

Phase I: Since the scope of the work is broad and incorporates different types of heritage collections, the primary objective was to identify different heritage items and the available information from various sources. Therefore, different places, including the monuments, artisan clusters (designated locations for dominant traditional crafts and artisans), cultural institutions like J and K Cultural Academy, Craft development Institutes, museums, radio and television station libraries, college museums, shrines, graveyards, etc. were visited and surveyed for identifying and collecting relevant information about culturally essential items.

Phase II: After identifying appropriate cultural heritage collection items, the pertinent information was gathered through different available resources, including historical documents, conversations with reputed historians, and caretakers of monumental and historical sites. In the case of arts and crafts, short interviews were conducted with artisans and master craftsmen to document information about different stages of craft design and development. Similarly, for manuscripts, eminent manuscript scribes and orators with sound personal collections were consulted to reveal the authenticity, time period, authority, etc.

Musical scores available at television and radio station libraries were also identified and considered for traditional music collections, especially folklore. These collections were also incorporated into the digital repository, retaining the original format to ensure minimum data loss.

The stone inscriptions in different languages, mainly Arabic and Persian, from different historical periods were identified by visiting graveyards, shrines, and other monumental structures. The collection of ethnobotanical tools

available at the ethnobotanical museum in Srinagar was also considered and included in the heritage preservation. The collection also documented and incorporated the efforts to preserve the information about indigenous fruit and flower varieties available at Sheri Kashmir University of Science and Technology-Kashmir.

Phase III: High-resolution digital cameras, scanners, and audio/video recording equipment were employed for capturing best-resolution images, recording audio, and shooting onsite videos. The manuscripts were scanned using flatbed or handheld scanners to carryout digitisation procedures for creating full-text searchable PDFs. The deciphered information was collected by general observation, conversations with the owners or caretakers, and consulting other primary sources.

Phase IV: Based on the availability of varied forms of cultural heritage items, small testbeds were created for designing miniature digital collections of different elements, and appropriate metadata schemas were identified for the enrichment and representation of collections wherever available. However, in certain instances where proper representation using existing metadata schemas was impossible, user-defined metadata based on standard flexible metadata frameworks was created and used with provisions to facilitate interoperability through OAI-PMH compliance and metadata crosswalks with other widely used metadata standards.

Phase V: This phase was associated with identifying an appropriate Open Source solution for creating the mini digital library collections of heritage items. A comparative analysis of various open source digital library software was undertaken and Greenstone, was chosen for building and managing the collections using its various user-friendly features for gathering, enriching, customising, and distributing digital collections in different formats. The software also supports metadata harvesting through OAI-PMH, facilitating interoperability with other repositories and aggregators.

Phase VI: The last step focuses on customisation of the user interface for such collections to enable a cross-collection search based on successful interoperability procedures and metadata mappings.

The Progress So Far

The testbeds for managing different collections were created, and various aspects facilitated smooth searching and effortless browsing by creating adequate search indexes based on maximum metadata enrichment. Available plugins were considered for processing different types of files with varied formats. Greenstone, was used for building and managing collections, and the user interface was customised to incorporate the required functionality for browsing and search patterns simpler, more appealing and user-friendly. The repository testbed collections will help to act as a foundation stone for evolving a prototype digital archiving facility to host

cultural heritage items across different collection types irrespective of format, type or domain for enabling a standard facility for cross-collection browsing and searching.

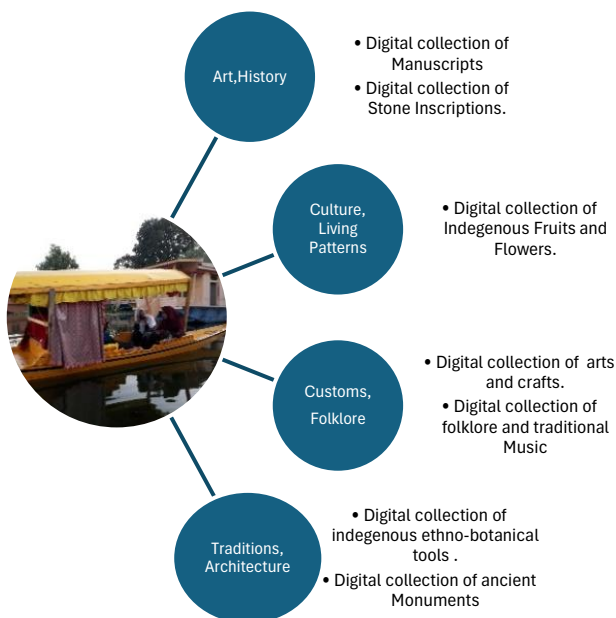
Table 1 provides examples of different cultural items under various categories and the collection type depicting different formats included in the process.

Table 1: Different types of selected cultural heritage Items

Category	Example	Collection Type
Art and Culture	Folklore, Indigenous songs in different genres.	Audiovisuals
	Biographies of artists and singers.	Pdfs
Tools and Techniques	Ethnobotanical Tools, Utensils. Etc.	Images / Audios / pdfs
Architecture and Art	Monuments, Shrines, Inscriptions	Images / Pdfs / Audios
Knowledge Assets	Manuscripts/Inscriptions/engravings	Images / Pdfs / Audios
Agriculture and Floriculture	Fruit and Flower varieties	Images / Pdfs
Arts and Crafts	Carpets, Paper Machie, Shawls, wicker works, etc.	Images / Pdfs / Audio Visuals
	Biographies of artisans	Pdfs
Special Collection	Marsia Manuscripts	Audios / Videos
	Biographies of Marcia Writers and Orators	Pdfs

Digital Curation Framework

The present work adopts a digital curation framework consists of six interrelated stages: identification, acquisition, digitization, metadata enrichment, preservation, and access. Cultural resources are first identified through surveys and stakeholder consultations. The selected resources are then digitized using appropriate technologies and enriched with adequate metadata to ensure long term preservation, sustainability and accessibility through the implementation of a centralized cultural heritage repository.

Fig. 1: An illustration of digitised collections of heritage items.

Issues and Challenges

Many challenges were faced during all these phases, and appropriate steps were taken to address them. The problems mainly faced were concerning access to the items, sites, and related information and the diversified nature of the heritage collections, besides other issues related to collection management in an online environment like the choice of appropriate digital library software, metadata formats, and customisation. Few most specific problems are discussed herein:

(a) Access to Different Types of Heritage Sites/Monuments

Many monumental sites deemed heritage sites are maintained and preserved by the Archeological Survey of India and are mostly restricted to the general public. The government has also secured and protected many monumental structures, and these sites are also inaccessible to the masses. Therefore, the most important consideration was to seek proper permissions from the concerned authorities for site visits, and data collection and efforts were put in to convince them through deliberations about the aims and goals of the project.

(b) Identification and Approaching the Master Artisans and Craftsmen

The identification of artisan clusters, particularly related to carpet weaving and paper-mâchié, was carried with utmost care to include the master artisans and craftsmen who have a reputation in particular art and have

gained a lot of fame over time. It was again an uphill task to convince them to share their expertise and knowledge by sparing their valuable time for interviews and documentation at their convenience.

(c) Issues in Building Ethno-Botanical Collections

Since prehistoric times, ethnobotanical tools have been predominantly used in Kashmiri society and have sharply disappeared with time. A personal ethnobotanical collection in the form of a museum maintained by a professor from one of the colleges of Kashmir valley includes some of the unique tools of cultural value. Efforts were put in to convince the college authorities, particularly the professor, to make the collection available for building its digital library. Similarly, other collections in the private capacity of different families or individuals are almost inaccessible as most are hesitant to provide access.

(d) Issues in Building Manuscript Collections

Rich manuscript collections in various languages are maintained in library archives and scattered across society as a part of personnel collections of different households. Many people feel reluctant to make their collections available for the said purpose, and convincing them as such becomes more challenging. Kashmiri Marsiya manuscripts are unique because the orators often use them to read in big gatherings by adopting different rhythms and stressing different words to make them more convincing. Therefore, besides digital copies of manuscripts, audio files of different marsiyas are also incorporated to preserve the natural way the traditional marsiyas are orated.

(e) Metadata Concerns

Assigning collection-specific metadata poses many challenges for digital curators, especially in choosing an appropriate metadata schema with a rich metadata element framework that could easily be mapped with other schemas for facilitating interoperability and, ultimately, cross-collection searching. In many collections, the standard metadata schemas or encoding systems were used, and in other instances, user-defined metadata based on an existing scheme was created and used for managing the collections.

(f) Copyright and Ethical Issues

One of the important challenges encountered during the study was the copyright and usage rights associated with varied cultural resources. Many manuscripts, oral traditions, folklore recordings, and personal collections are maintained by families, groups, religious institutions, or individual custodians, etc. This situation results in the absence of documented ownership records that often complicates the digitization and dissemination of these resources. Utmost care was taken to obtain informed consent from the stakeholders particularly from the collection owners before digitization to enforce a dissemination mechanism with access control using defined intellectual property rights policies to safeguard the interests of collection

holders and simultaneously ensuring broader access to these cultural assets.

Conclusion

Cultural Heritage, in tangible and intangible forms, depicts the uniqueness of a particular society and showcases its diversity. The Cultural heritage is inherited from a rich historical past and needs to be preserved through the best possible means for the benefit of future generations. Digital Preservation plays a pivotal role in the safeguarding of cultural Heritage by not only preserving heritage through digitisation but also through the application of allied procedures for managing, hosting, and distributing such collections. Cultural heritage preservation initiatives in modern times are deemed of utmost importance globally as we witness collaborative heritage projects like Europeana, Athena Plus, etc., hosting cultural heritage from across Europe. The present work along the same lines attempts to create a digital collection of cultural heritage items of Kashmir for facilitating collaborative efforts towards the long-term preservation of cultural collections. The digital repository will facilitate a single interface for searching and browsing articles by including cross-collection search and increased visibility through OAI-PMH compatibility. Many issues associated with the process will be addressed through consultation with different experts through open forums so that broader perspectives can be considered based on experience and real-time testing environments. The integrated access to varied resources will thus be facilitated through adequate metadata schema mapping for ensuring interoperability between different subsystems for facilitating federated searching. The future thrust areas may also include large-scale timely digitization of cultural assets, multilingual interfaces implementation, linked open data and artificial intelligence integration for automatic metadata generation, and 3D visualization technologies for monuments and artefacts. Collaboration with national and international cultural heritage networks can further enhance visibility, accessibility, and preservation of this rich cultural legacy.

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