

Findability and Accessibility of Electronic Thesis and Dissertation Repositories of Newly Established Central Universities in India

Aqib Mehroof¹ and Somesh Rai²

¹Department of Library and Information Sciences, Central University of Punjab Bathinda

²Assistant Professor, Department of Library and Information Sciences, Central University of Punjab Bathinda

Abstract

As professionals and academicians, we are all aware of ETDs (Electronic Theses and Dissertations) ' impact on the discourse, communication, and dissemination of research in our respective fields. ETDs are more widely used and advantageous than their conventional equivalents. ETDs, which are academic works that students submit as a requirement for their degree programs, provide various advantages made possible by technological improvements. One significant benefit is the simplicity with which digital research materials may be accessed and distributed, making knowledge easy to share and retrieve. This paper discusses the ETDs' importance, aim, and initiatives in India. In addition, it discusses the Central universities and their role and contribution to ETDs. The study's primary objective is to evaluate the ETDs platform aspect of newly established central universities in India. ETDs offer several advantages over their traditional counterparts. They provide easy and convenient access to research work, and their accessibility enhances the visibility and usability of the research. We will try to evaluate the Findability and Accessibility of ETDs that are really easily discoverable and accessible.

In this study, a webometric method is utilized for the evaluation of the websites of ETDs. Webometrics is the quantitative study of developing and using web-based information resources, structures, and technologies. As is common knowledge, a website serves as a digital representation of the ETDs themselves, reflecting the discoverability and accessibility of the ETDs' content. Using webometrics tools Google PageSpeed Insights, we assess the discoverability and accessibility of the websites of ETDs. We also used a manual approach for findability and accessibility; a simple Google search for findability and for accessibility, we check whether ETDs provide contents openly, full-text availability, and how many platforms a university uses for content dissemination. The present work is limited to newly established central universities. The data were acquired and analyzed using the methods as mentioned above and instruments.

This study's findings shed light on the applicability of webometrics in assessing the ETDs' findability and accessibility. It also sheds light on the significance of other parameters affecting discoverability and accessibility in ETDs. The study attempts to justify using a webometric approach to evaluate the platform aspect of ETDs. By focusing on discoverability, and accessibility, we provide a comprehensive website-evaluation approach to ETDs, which will aid in assessing the quality, influence, and standing of ETDs. This method will apply to other ETDs Platforms, and similar methods can also be developed in the future.

Keywords: Accessibility, Electronic Theses and Dissertations (ETD), Findability, Webometrics

Corresponding Author: Dr. Somesh Rai, Email: someshraais@gmail.com

1. Introduction

In the present era of ICT, Electronic Theses and Dissertations (ETD) represent a significant amount of scholarly work and play a crucial role in disseminating scientific results. ETDs cover a wide range of academic literature in our respective disciplines. It provides more comprehensive access to academic research and helps researchers, academicians, and professionals with new creations and innovations. Theses and dissertations contain outcomes of individual scientific work (Schöpfel et al., 2014). In this digital age, ETDs are the most common document to be discovered and used (Stock, 2008). ETDs are the digital version of a student's thesis or dissertation that describes the research or scholarship of a researcher/student. It is expressed in a way appropriate for machine archives and global retrieval. It aims to promote worldwide access (Vijayakumar et al., 2004).

In many academic institutions and universities worldwide, the transition to electronic submission and archiving of theses and dissertations has grown more widespread. The advantages of increased searchability, cost-effectiveness, wider diffusion, and accessibility drive this transition. It allows academics, students, and the general public to browse and download scholarly content online without visiting a physical library. Using digital platforms, academic institutions may speed up the submission process, enable effective peer review, and offer open access to scholarly publications worldwide. Electronic archiving also provides long-term preservation and lowers the need for physical storage, fitting with the changing technical landscape and encouraging wider distribution of significant scientific contributions.

ETDs' free availability can also help universities raise awareness of their research efforts worldwide. Over the last decade, the global rise of ETDs among universities and other organizations has been phenomenal. Furthermore, the number of ETDs Initiatives and Collections is increasing. Open access aids in developing the ETDs and IRs (Gunjal & Gaitanou, 2015). It is well acknowledged that ETDs can play an essential role in research by utilizing knowledge organization system design to improve the performance of information retrieval systems (Gunjal & Urs, 2010).

1.1. ETDs initiative in India

India is leading the development of the open access movement by establishing a number of open access repositories and embracing free and open-source software. When building an institutional repository in a local library, Indian information workers experiment with free software. If an IR is successfully implemented in the local library setup, it becomes open to a broader audience (Ghosh, 2007). According to Arunachalam (2004), encouraging scientists to self-archive their research is the most excellent strategy to make scientific information more accessible globally. He also claimed that every institution needs a champion (or champions) to encourage the establishment of institutional archives and persuade scientists to deposit their papers in them.

The Electronic Theses and Dissertations movement in India has gathered significant momentum over the years, with several initiatives and digital repositories devoted to promoting and facilitating ETDs. The ETDs

FINDABILITY AND ACCESSIBILITY OF ELECTRONIC THESIS AND DISSERTATION REPOSITORIES OF
NEWLY ESTABLISHED CENTRAL UNIVERSITIES IN INDIA

movement in India continues to grow, and more academic institutions and universities are adopting digital submission and archiving practices. The Indian Institute of Technology (IIT) Bombay's Central Library launched the ETD project in 1999, followed by Vidyanidhi at Mysore University in 2000, Indian Institute of Science and Indian Institute of Astrophysics in 2004, IIT Delhi and IIT Kanpur in 2005, Indian Institute of Oceanography in Goa in 2006 (Das et al., 2007).

Table 1. Major ETDs Initiatives in India Name of Repositories

| | Name of Institution | URL/Link | Year |
|--------------------------------|---|---|-------------|
| Dspace@IITB | Indian Institute of Technology Bombay | http://dspace.library.iitb.ac.in/jspui/ | 1999 |
| Vidyanidhi | Univ. of Mysore | http://dspace.vidyanidhi.org.in:8080/dspace/ | 2000 |
| etd@IISC | Indian Institute of Science | https://etd.iisc.ac.in/ | 2004 |
| Open Access Repository of IIAP | Indian Institute of Astrophysics | http://prints.iiap.res.in | 2004 |
| Eprints & ETD @IIT Delhi | Indian Institute of Technology Delhi | http://eprint.iitd.ac.in/dspace/ | 2005 |
| Theses Repository@IITK | Indian institute of Technology Kanpur | https://etd.iitk.ac.in:8443/jspui/ | 2005 |
| NIO Digital Repository Service | National Institute of Oceanography | https://drs.nio.res.in/drs/ | 2006 |
| INFLIBNET (Shodhganga) | University Grants Commission, New Delhi | https://shodhganga.inflibnet.ac.in/ | 2008 |

ETD initiatives are essential because financial barriers prevent researchers in developing countries from accessing the necessary research information. Fox (1998) stated, "Universities have theses and dissertations, and smaller institutions have bachelor dissertations and other major papers. These parts of the "gray literature" are largely ignored and disappear from view." A regulatory policy and implementation system for upholding standards, preserving, and accessing doctoral research from Indian institutions are being planned by the University Grant Commission (UGC), the highest authority of the Indian government. To address issues relating to institutions of knowledge production, knowledge use, and knowledge dissemination, the Planning Commission established the National Knowledge Commission on June 13, 2005, and the Prime Minister of India officially launched it on August 2, 2005. This initiative was inevitable, given the current state of the knowledge economy. The commission has recommended institutional repositories for research papers, reports, institutional publications, and ETDs. Supporting ETDs is one of the most straightforward and most efficient methods to encourage open access to research and educational resources. In India, there are over a hundred research institutions and approximately 1000 universities, including central universities, state universities, deemed universities, private universities, and specialized universities, that are regarded

to give doctoral or master's degrees annually. Thus, the number of theses and dissertations is rising, but some are unpublished and generally difficult to obtain.

1.1. New Central Universities

Newly established Central universities are public universities established by an Act of Parliament of the Indian government. These institutions encourage higher education and research in diverse parts of the country while also providing students with a high-quality education in various areas. Each central university's aim and objectives may differ depending on its charter, institutional interests, and regional needs. Central universities, in general, strive to provide quality education, conduct research and innovation, foster interdisciplinary learning, and contribute to the nation's overall growth and development through academic achievement (Acts and Rules | Government of India, 2017) (MINISTRY OF LAW AND JUSTICE, 2023). The central university act 2009 aims to build and operate central universities in a way that assures academic excellence, autonomy, and accountability. It emphasizes the value of high-quality education, research, and innovation at these institutions. All the central universities focus on developing minds through skills and innovation-driven teaching and research.

1.2. Findability and Accessibility

Findability is the capacity of a website to be discovered. Findability describes how simple it is for users to find and access a website or its content. It is a website's ability to be found by users and search engines. Findability describes a website's discoverability or how readily the target audience may locate and access it.

Accessibility: Accessibility is the capability of a website to be utilized by individuals with disabilities. Accessibility is the inclusive practice of ensuring no obstacles prohibit users from interacting with or accessing websites. It guarantees that persons with disabilities can access and utilize websites efficiently. It implies that anybody may perceive, comprehend, navigate, and engage with websites or digital material regardless of capability.

The findability and accessibility of ETDs, can foster a culture of openness and knowledge-sharing while promoting inclusivity and equity in research dissemination. This benefits not only the academic community but society at large by facilitating the exchange of knowledge and advancing research and innovation and the evaluation of the findability and accessibility of ETDs is essential to ensure that research is widely accessible, inclusive, and impactful. It facilitates compliance with legal requirements, enhances user experience, and reflects an institution's dedication to promoting knowledge dissemination and equitable access to information for all users.

2. Background work

Alam and Pandey (2012) acknowledged that theses and dissertations have long served as the cornerstone of higher education globally. They believed these are the primary source of information resulting from in-

depth research, deliberate study, and expert guidance over a predetermined period. They also emphasized that accessibility was challenging because university libraries and archives were the sole access sites due to the non-publishing status of theses and dissertations over time. Finding information regarding these in Nigeria is becoming difficult due to these factors. Ifijeh (2014) also said that Theses offer significant research findings that may be applied and implemented in Nigerian companies and other economic sectors. Han (2014) noticed that the typical distribution method for scholarly publication and distribution only sometimes makes theses and dissertations available. This author said these materials are either partially or never categorized inside typical libraries' workflow, making them difficult to access. The National Policy on Education (2013) states that university research is helpful to the nation's developmental goals, and particular focus must be given to promoting, conducting, and disseminating original research and knowledge with a worldwide audience. This stance is consistent with international open policies for information and knowledge, which aim to make research output more visible and available. This is an important reason to make dissertations widely available and accessible. Canada (2009) mentioned a benefit produced by the open access movement: the prospect of offering equal access to information to all countries, regardless of their position. Open access allows academics to share their discoveries with a global audience, which enhances the number of citations generated for their scholarly work. The Budapest Open Access Initiative (BOAI) recommends two approaches to open access for research output: open-access institutional repositories (IRs) and open-access journals. After That, IR has been growing at a steady pace. Usability evaluation is essential and incorporated into the planning and implementation of information systems. Aliyu (2015) stated that usability depends on to what extent the system features are suitable to requirements and expectations. Madan and Dubey (2012) say that usability is critical in developing and deploying efficient and interactive software systems.

3. Objective

The study's primary objective is to evaluate the ETDs platform aspect of newly established central universities in India. ETDs offer several advantages over their traditional counterparts. They provide easy and convenient access to research work; their accessibility enhances the visibility and usability of the research. We will try to evaluate the Findability and Accessibility of ETDs that are easily discoverable and accessible.

4. Methodology

4.1. Data Collection and Analysis

The present study is the webometrics study of electronic theses and dissertations of newly established central universities. It is used to study the web-related phenomenon of the ETDs. Webometrics is "the study of the quantitative aspects of the construction and use of information resources, structures, and technologies on the Web drawing on bibliometric and informetric approaches" (Björneborn & Ingwersen, 2004).

For the data collection, first, we consult the central university act 2009 to gather information on newly established central universities. We turn up with 13 universities established under the central university act 2009. We conducted a detailed web survey of each university to know the ETDs status of universities.

Table 2. Central Universities and their ETDs (status till 30th May 2023)

| Central Universities | University Library | ETD Repository |
|--|---|---|
| CU South Bihar (https://www.cusb.ac.in/) | https://www.cusb.ac.in/central-library/ | NA |
| CUGujarat (https://www.cug.ac.in/) | http://14.139.122.35/cuglibrary/ | NA |
| CUHaryana (https://www.cuh.ac.in/) | https://library.cuh.ac.in/ | http://idr.cuh.ac.in:8080/jspui |
| CU Himachal Pradesh (https://www.cuhimachal.ac.in/) | https://cuhpopac.informaticsglobal.com/ | NA |
| CUJammu (https://www.cujammu.ac.in/) | https://cujammu.ac.in/Default.aspx?option=article&type=single&id=35&mnuid=738 | NA |
| CUJharkhand (http://cuj.ac.in/) | http://cuj.cuj.ac.in/library-cuj.php | NA |
| CUKashmir (https://www.cukashmir.ac.in/) | https://web.cukashmir.in/#/administration;id=4A10B1AA-BDCD-49E7-824D-8B8645A13BE2 | NA |
| CUKarnataka (https://www.cuk.ac.in/) | http://cuklibrary.ac.in/index.html | NA |
| CUKerala (https://www.cukerala.ac.in/) | https://library.cukerala.ac.in/ | NA |
| CUOdisha(https://cuo.ac.in/) | https://cuo.ac.in/Facilities_Library.asp?pgid=7 | http://library.cuo.ac.in/xmlui/ |
| CUPunjab (https://cup.edu.in/) | https://cup.edu.in/library.php | http://kr.cup.edu.in/handle/32116/1519 |
| CURajasthan (https://www.curaj.ac.in/) | https://www.curaj.ac.in/library | https://www.curaj.ac.in/library/etds-curaj |
| CU Tamil Nadu (https://cutn.ac.in/) | http://centrallibrary.cutn.ac.in/ | NA |

After the data collection, Data is tabulated in google sheets and analyzed by checking the URLs whether their access is on the Internet or intranet. After the analyses, data is evaluated accordingly to address the aim of the study by using the online webometrics tool Google PageSpeed Insights. PageSpeed Insights is a free performance tool provided by Google that analyzes the performance and optimization of a particular webpage and delivers page speed ratings for both the mobile and desktop versions of the page. The tool analyzes URLs and breakdown into four aspects for analysis, i.e., Performance, Accessibility, Best Practice, and SEO.

- 1. Performance:** This factor considers how quickly a website loads and how responsive it is. It examines factors like server response times, render-blocking resources, optimized pictures, and other things that affect the website's speed and efficiency.

2. **Accessibility:** Accessibility is concerned with ensuring that websites are usable by people with disabilities. PageSpeed Insights checks for issues related to color contrast, alternative text for images, keyboard navigation, and other elements that contribute to making the website accessible to a wide range of users.
3. **Best Practice:** This element examines compliance with web development best practices and standards. It determines whether the website adheres to suggested coding practices, employs new technology, avoids deprecated features, and employs security measures to improve the site's overall quality.
4. **SEO (Search Engine Optimization):** PageSpeed Insights also considers how well a website is optimized for search engines. It assesses factors that can influence search engine rankings, such as the use of meta tags, structured data, and mobile friendliness.

The tool finds areas for optimization and gives specific recommendations for improvement. (Google PageSpeed Insights Reports: A Technical Guide, 2022).

4.2 Manual Search

A simple search method was also conducted on Google to know the findability. We manually performed the Google search in 'Incognito Mode', by using the search string 'Electronic Theses and Dissertation of <University Name>' for each university.

For accessibility, we verified manually also whether these ETD repositories provide their content openly, its' full-text availability, and the platforms used for dissemination.

5. Data Analysis and Results

5.1. Google PageSpeed Insight

Under the central university act 2009, 13 universities were established. Out of 13 universities, only four universities (CUP, Bathinda, CUHaryana, CUOdisha, and CURajasthan) have their ETDs or institutional repository, and the rest of the universities avail their theses and dissertation through Shodhganga. The CUOdisha ETD website is not working from these four universities, and the other three universities' ETD URLs were evaluated by using Google PageSpeed insight.

Table 3. CU Punjab

| Mobile | | | | Desktop | | | |
|-------------|---------------|---------------|-----|-------------|---------------|---------------|-----|
| Performance | Accessibility | Best Practice | SEO | Performance | Accessibility | Best Practice | SEO |
| 70 | 72 | 68 | 76 | 86 | 79 | 68 | 73 |

Table 3 shows that the CUPB ETD repository performance is 70 out of 100, accessibility is 72, practice is 68, and Findability or searchability is 76 on mobile phones. While on the desktop, performance is 86, accessibility is 79, practice is 68, and searchability is 73.

Table 4. CUHaryana

| Mobile | | | | Desktop | | | |
|-------------|---------------|---------------|-----|-------------|---------------|---------------|-----|
| Performance | Accessibility | Best Practice | SEO | Performance | Accessibility | Best Practice | SEO |
| 55 | 70 | 73 | 82 | 48 | 74 | 77 | 80 |

Table 4 shows that the CUH ETD repository performance is 55, Accessibility is 70, Practice is 73 and searchability is 82 on mobile phones. On the desktop their performance is 48, accessibility is 74, practice is 77 and Searchability is 80.

Table 5. CURajasthan

| Mobile | | | | Desktop | | | |
|-------------|---------------|---------------|-----|-------------|---------------|---------------|-----|
| Performance | Accessibility | Best Practice | SEO | Performance | Accessibility | Best Practice | SEO |
| 52 | 78 | 68 | 97 | 53 | 76 | 68 | 100 |

Table 5 shows that the CUR ETD repository performance is 52, Accessibility is 78, Practice is 68, and searchability is 97 on mobile phone. On the desktop their performance is 53, accessibility is 76, practice is 68, and Searchability is 100.

Table 6. INFLIBNET-Shodhganga

| Mobile | | | | Desktop | | | |
|-------------|---------------|---------------|-----|-------------|---------------|---------------|-----|
| Performance | Accessibility | Best Practice | SEO | Performance | Accessibility | Best Practice | SEO |
| 54 | 66 | 64 | 75 | 30 | 66 | 68 | 73 |

Table 6 shows that the Shodhganga repository performance is 54, Accessibility is 66, Practice is 64 and searchability is 75 on mobile phone. On the desktop their performance is 30, accessibility is 66, practice is 68, and Searchability is 73. This evaluation serves as a proxy for those universities providing their ETDs only through Shodhganga.

5.2. Manual Approach for Findability

Google is a widely used and most popular search engine due to its efficient and fast performance, user-friendly interface, and robust security features. We use Google to check the find theses and dissertations of universities like a simple user.

Firstly, we searched CUPunjab and found that the institutional theses submitted in Shodhganga come first, and their IR comes on third. Secondly, we searched CUHaryana and found that their IR comes on second, and Shodhganga comes on first. Then we searched CURajasthan and found that their thesis and dissertation list come first, at third their ETD comes, and Shodhganga comes fifth.

5.3. Manual approach for Accessibility

We found that the CUPunjab provide their theses and dissertations content consolidated in their ETD and full text provided through Shodhganga.

The CUHaryana provides its content openly on its ETD and through Shodhganga also.

The CURajasthan archive their theses and dissertation in their ETD and provide full-text through Shodhganga.

6. Discussion

The main goal of Electronic Theses and Dissertations (ETDs) is to streamline and modernize the creation, submission, preservation, and access to graduate-level academic research. ETDs attempt to increase the accessibility, visibility, and impact of scholarly work by converting from conventional print formats to digital ones. We evaluate the ETDs websites to assess their findability and accessibility. By analyzing the websites, we found that the findability and accessibility of the universities' ETDs are better than Shodhganga on both mobile and desktop. While on the other hand, the findability and accessibility according to the manual approach, the Shodhganga is better than other ETDs and comes first. It also provides content openly, in full-text version. Some of the universities provide content in their ETDs and mostly make it available through Shodhganga.

6.1. Suggestions and Recommendations

- ❖ It is recommended to provide quick server response time, landing page redirection, avoid render blocking script, enable GZIP compression, proper browser caching, well-optimized images, and minimize CSS, JavaScript, HTML codes, to enhance the findability and accessibility of ETD websites.
- ❖ To Eliminate render-blocking resources ETDs should use CSS and Javascript.
- ❖ ETDs need to add LCP element Dynamically to preload the image to improve LCP (largest contentful paint image)
- ❖ Text-based resources should be served with compression (gzip, deflate, or brotli) to minimize total network bytes.
- ❖ The web design and page links must be fixed so that search engines can quickly access and index the most recent content added to the website, and visitors can readily discover their relevant information in the shortest amount of time.
- ❖ The ETDs try to improve their content delivery by providing content in all formats. It enhances accessibility.

7. Conclusion

The ETDs cover a wide range of literature and help users fulfill their needs. It is crucial to assess their findability and accessibility so that they can provide good-quality research to a broader audience. From the foregoing analysis of the ETDs website, the study facilitates evaluating the platform aspect of ETDs. Hence web presence is a way to judge the ETDs performance. We conducted a webometric study of the newly established central universities' ETD websites. Webometric analysis aids in improving the performance of a website to update, redesign, add, or modify it. We evaluate the central universities' ETDs website on findability and accessibility, this method can also be used for other ETD platforms, and a similar kind of framework can also be developed in the future with some additions.

In today's era, websites have become a valuable information communication, dissemination, and retrieval source. The availability and expansion of websites provide access to information from all over the world. So, these two aspects are always relevant for humans and machines. After one or two decades, when researchers use Artificial Intelligence (AI) assistants for search and complex intellectual exercises, AI will provide a base for scholarly research. AI may use theses and dissertations as data in the future; at that time, these aspects are essential for ETDs.

References

- Alam, N., & Pandey, P. (2012). *GeoTheses: Development of union catalogue of Indian geoscience theses using GSDL*. The Electronic Library.
- Aliyu, M. M. (2015). *Design and implementation of web-based academic information system (WEBAIS) for Nigerian Universities*. A Master's Thesis Submitted to Ahmadu Bello Das, A. K., Sen, B. K., & Dutta, C.
- (2007). *ETD policies, strategies and initiatives in India: A critical appraisal*.
- Björneborn, L., & Ingwersen, P. (2004). *Toward a basic framework for webometrics*. *Journal of the American Society for Information Science and Technology*, 55(14), 1216–1227.
- Canada, D. (2009). *Open access and developing countries*. Retrieved from http://eprints.rclis.org/bitstream/10760/13757/1/OA_and_Developing_Countries.pdf
- Ghosh, M. (2007). *ETDs in India: Towards a national repository with value added e-theses service*.
- Gunjal, B., & Gaitanou, P. (2015). *ETDs and Open Access for Research and Development: Issues and challenges*.
- Gunjal, B., & Urs, S. R. (2010). *Knowledge Organisation Systems in ETDs: A Comparative Study*. *Proceedings of 13th International Symposium on Electronic Theses and Dissertations (ETD 2010)*; June 16-18, 2010, Austin, TX, USA.
- Han, Y. (2014). *Guidelines for collecting usage metrics and demonstration of value for ETD programs*. *Guidance Documents for Lifecycle Management of ETDs*.
-

- Ifijeh, G. (2014). Adoption of digital preservation methods for theses in Nigerian academic libraries: Applications and implications. *The Journal of Academic Librarianship*, 40(3–4), 399–404.
- Jeysankar, R., & Babu, B. R. (2009). Websites of universities in Tamil Nadu: A webometric study.
- Madan, A., & Dubey, S. K. (2012). Usability evaluation methods: A literature review. *International Journal of Engineering Science and Technology*, 4(2), 590–599.
- Mustafa, S. H., & Al-Zoua'bi, L. F. (2008, December). Usability of the academic websites of Jordan's universities an evaluation study. In *Proceedings of the 9th International Arab Conference for Information Technology* (pp. 31-40).
- MINISTRY OF LAW AND JUSTICE. (2023, March 24). Central University of Gujarat. Retrieved July 31, 2023, from https://www.education.gov.in/sites/upload_files/mhrd/files/upload_document/CentralUniversitiesAct.pdf
- Sarkar, A., Pal, A., & Kar, S. (2018). Webometric mapping of tourism sites in India. *Webometric Mapping of Tourism Sites in India*.
- Schöpfel, J., Zendulkova, D., & Fatemi, O. (2014). Electronic theses and dissertations in CRIS. *Procedia Computer Science*, 33, 110–117.
- Stock, C. (2008). Open access to full text and ETDs in Europe: Improving accessibility through the choice of language? *Grey Journal (TGJ)*, 4(2).
- Vijayakumar, J. K., Murthy, T. A. V., & Khan, M. T. M. (2004). Accessing Indian university research literature: Importance of ETDs in the verge of UGC-InfoNet. University, Zaria.