National ETD Repository Evaluation Using Web Analyzer: A Webometric Analysis of Shodhganga, India

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National ETD Repository Evaluation Using Web Analyzer:
A Webometric Analysis of Shodhganga, India

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ABSTRACT

ETDs are the Swiss-army-knife which has unearthed the shades of grey by bringing forth the until now hidden research to the forefront of the world. ETDs powered by open source software like DSpace, EPrints build up information ecosystem for effective storage and retrieval of theses and dissertations which take years of hard work to culminate. Such systems need to be evaluated as its purpose gets defeated if users find it hard to retrieve desired information from it. Webometrics involves the study of the web through which one can analyze the number of hyperlinks, type and structure of the hyperlinks, website usage and its effectiveness. The present article is an attempt to assess the performance of online portal of the national ETD repository of India by using Web Analyzer Test Score (WATS). It also highlights the status of Open Access (OA) ETD repositories with respect to other OA content like research papers, conference papers, etc. along with exploring the software used for Indian ETD Repositories. The overall score of the webometric analysis was found to be 6.4.

KEYWORDS

Electronic Theses & Dissertations, ETD, INFLIBNET, Shodhganga, Web Analyzer, Webometrics

INTRODUCTION

A dissertation or thesis is a work submitted in support of candidature for a doctorate or master's degree, which presents the author's research and findings. Electronic versions of theses and dissertations collectively are called ETDs (Electronic Thesis and Dissertation). Johns Hopkins University which started its ETD program beginning in the fall semester of 2013, defined an ETD as the digital version of a dissertation that is available to the public via the internet (Johns Hopkins Sheridan Libraries, n.d.). The Digital Library and Archives (DLA) section of the Virginia Tech (USA), which started its journey towards ETDs from January 1, 1997, considers ETDs as a technologically advanced medium for expressing the author's ideas. An ETD documents the author's years of academic commitment. The DLA describes why the work was done, how the research relates to previous work as recorded in the literature, research methods used, the results, interpretation and discussion of the results, and a

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summary of conclusions. The ETD is different, however. The DLA website enumerated the benefits of having theses and dissertations in the electronic format as follows:

- More access to research:
  - Research is available on campus.
  - Research is accessible worldwide.
- Less expense to authors and libraries:
  - No paper costs
  - No copying costs
  - No physical shelf space
  - Lower cataloguing costs
- Better presentation of research (not available in paper format):
  - Addition of multimedia files
  - More dynamic presentation of data
  - Hyperlinks
  - Programs and code

Duke University Libraries website has explained the benefits of ETDs to their students under the heading "What are the benefits of open access for my thesis or dissertation?" The benefits mentioned on their library ETD webpage resolves around:

- Greater visibility: helps improve reputation by making their research work highly accessible in electronic form.
- Rapid pace of scholarly communication via Internet to avoid long delays
- Economical as no additional costs associated with print theses and dissertations.
- Submitted ETDs part of a growing international collection through the Networked Digital Library of Theses and Dissertations and other such OA repositories.
- Easy discovery, and in turn making it much harder for anyone to appropriate research without giving due credit to the researcher.
- Full text availability of ETDs through open access is cited more often and is cited sooner.
- Multimedia objects, including colour images, hyperlinks, audio, video, spreadsheets and databases, even virtual reality worlds can be easily incorporated into and made available through ETDs.
- Researchers can include a stable URL for research work in their CV.
- OAI compliant ETD repositories are found by popular search engines.
- Open access to ETDs is the public contribution to scholarship.
- Fulfil unforeseeable information needs of diverse user community.
- 24/7 availability and accessibility of ETDs generates newer possibilities for interdisciplinary or cross-disciplinary research
- Facilitate the formation of unexpected research collaborations as the result of open access to scholarship.

STUDY OBJECTIVES:

Building a framework for a national ETD repository requires meticulous planning form ab initio. Study of the features, strengths and limitations of such a project through scientific method demands evidence based approach. The present study has adopted webometric analysis to deeper insight of the national ETD repository of India for which the following objectives have been framed:

1. Assess the performance of online portal of the national ETD repository of India by using Web Analyzer Test Score (WATS)
2. Examine the status of Open Access (OA) ETD repositories with respect to other OA content like research papers, conference papers, etc. (Figure 1 and Figure 2)
3. Examine the preferred software used for establishing Indian ETD Repositories

STATUS OF OA ETDS IN INDIA

The University Grants Commission (UGC) is a statutory body set up by the Government of India (GoI) under Ministry of Human Resource Development (MHRD) and is charged with coordination, determination and maintenance of standards of higher education. It provides recognition to universities in India and disburses funds to such recognised universities and colleges. As per the MHRD 2016 data, the Indian Higher Education Institutions (HEIs) status is tabulated below in Table 1.

Electronic Theses and Dissertations are primary sources of research materials that originate from doctoral theses/dissertations submitted to the universities for the award of Ph.D. and M.Phil respectively. As per UGC Notification (Minimum Standards & Procedure for Award of M.Phil./PhD Degree, Regulation, 2016) it is mandatory to submit an electronic version of theses and dissertations by the researchers in universities into a national repository with an aim to facilitate open access to Indian theses and dissertations by the academic community worldwide. Generally, they are put under the category of grey literature, and access to theses and dissertations remain closed, as only limited users can access the hard copies of the same via their libraries. The problem becomes worse if a scholar needs to consult theses belonging to other institutions. Thus, knowledge produced after years of hard work remained undiscovered, unused, uncaptured. In India, most of the libraries used to have restricted access to these and they are non-issuable items. With the coming of ETD repository, most of the concerns and difficulties were solved.

Figure 1. Data as on OpenDOAR - 23-Sep-2017

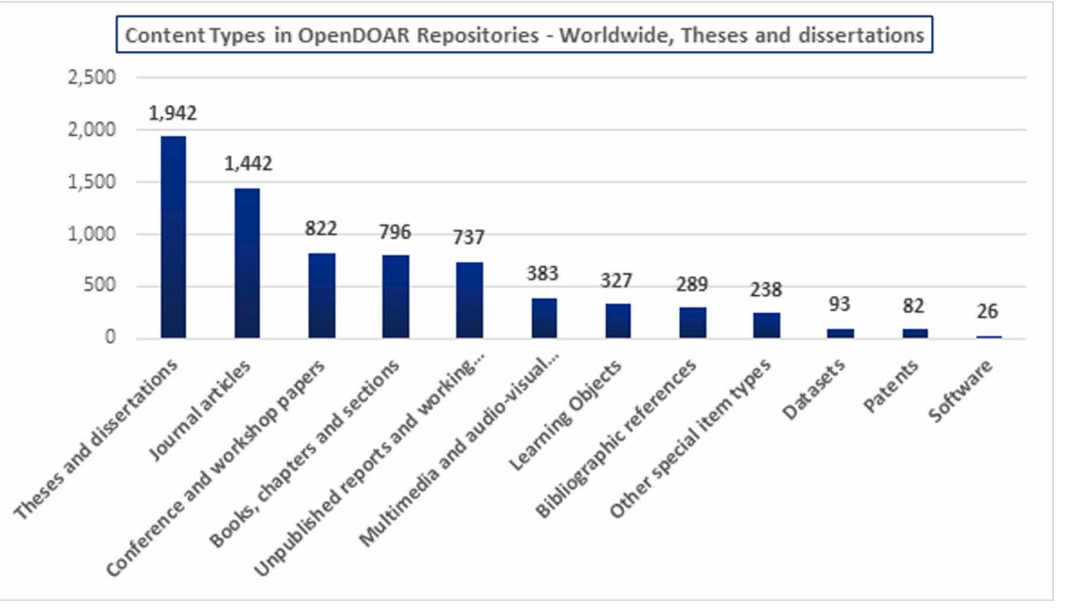


Figure 2. ETD share in the global OA literature

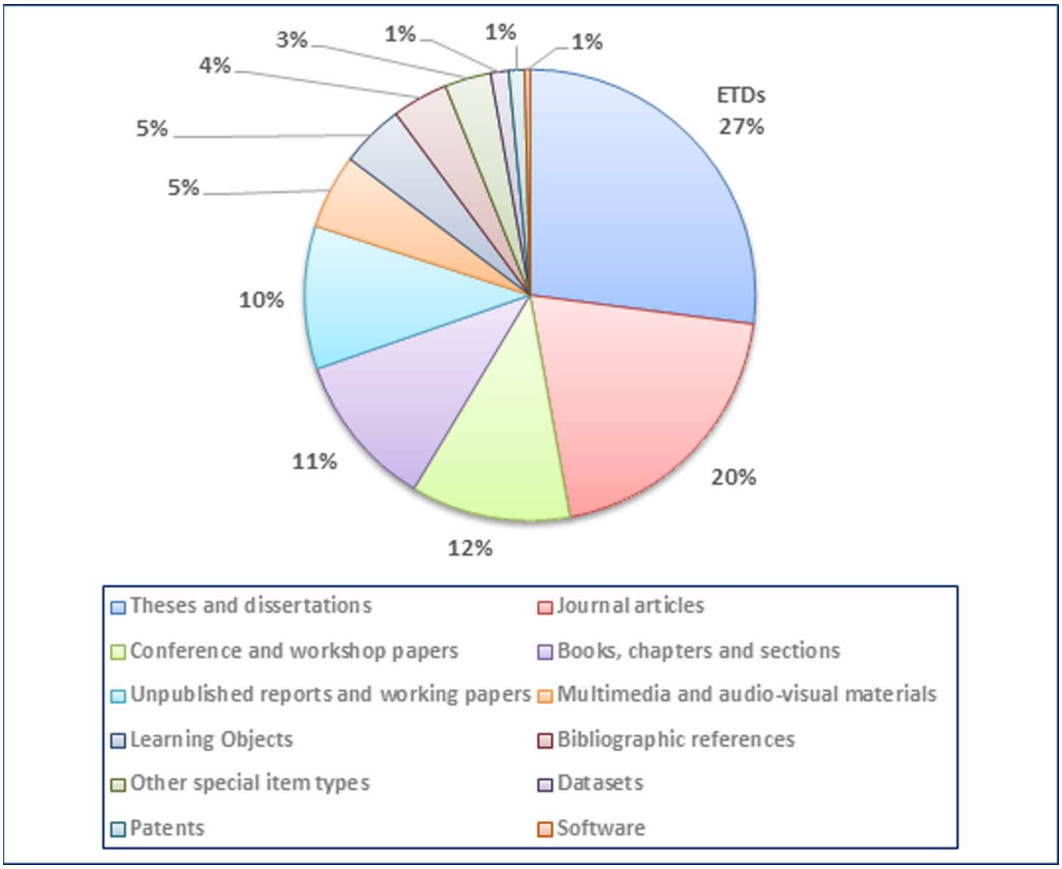


Table 1. Status of higher education institutions in India(Data Source: http://mhrd.gov.in/ statist)

University	**Central University**	**43**
	State Public University	316
	Deemed University	122
	State Private University	181
	Central Open University	1
	State Open University	13
	Institution of National Importance	75
	State Private Open University	1
	Institutions under State Legislature Act	5
	Others	3
	Total	**760**
College		**38498**
	Total	**39258**

SHODHGANGA: A RESERVOIR OF INDIAN THESES

Theses and dissertations document the new knowledge that is being created out of continuous and consistent endeavour of scholars. They are considered to be the rich, valuable and unique source of information, often put under the category of grey literature as they are not available through common publication channels linked with the publishing industry. In case they are not available for furthering research, the hard work involved in their creation is mere wastage of huge resources, both human and financial. In print format, they may remain an untapped and under-utilized asset, leading to unnecessary duplication and repetition. The Electronic Theses and Dissertations (ETDs) serve and satisfy the intended goals and purposes quite successfully.

The centrally-maintained digital repository, not only ensures easy access and archiving of Indian doctoral theses, but also helps in raising the standard and quality of research. It helps in addressing the serious issue of duplication of research. It also helps in dealing with the poor quality which is a consequence of the "poor visibility" factor in doctoral research output. As per the Regulation, the responsibility of hosting, maintaining and making the digital repository of Indian Electronic Theses and Dissertation (called "Shodhganga"), accessible to all institutions and universities, is assigned to the Information and Library Network (INFLIBNET). Universities are expected to submit the electronic version of the theses awarded by them to Shodhganga on a regular basis. If a university is not able to facilitate online submission of theses into the national ETD repository and Shodhganga, the university may accept e-version of theses on CD ROM / DVD ROM and send it to the INFLIBNET for offline submission. Designated University Coordinator needs to authenticate and certify that the student has submitted the complete, correct and same version of the thesis that is submitted in print.

INFLIBNET has developed a low-cost affordable integrated library automation system (ILMS) known as SOUL for Indian libraries. It hosts the national union catalogue, IndCat. Apart from hosting open access (OA) journals, it is responsible for maintaining the national level consortium known as e-ShodhSindhu providing access to premium scholarly journals. For colleges, it has made available consortium known as NLIST (National Library and Information Services Infrastructure for Scholarly Content). For students, it has launched another very useful Open Educational Resources (OER) project called ePGPathshala.

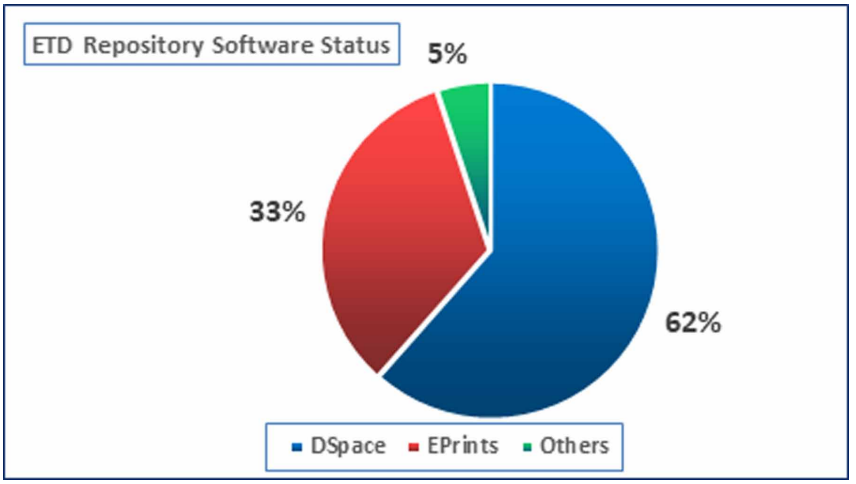
The INFLIBNET Centre promotes setting-up of institutional and ETD repositories in member universities using OAI-PMH compliant software. A number of member universities have already set-up their institutional and ETD repositories using either DSpace or other OAI-PMH compliant Institutional Repository software (Figure 3). It would be possible for universities having sufficient network and computing infrastructure to maintain their own ETD repositories wherein their research scholars could deposit e-versions of their theses and dissertations. In such a case, Shodhganga serves as backup archives. The Central ETD Repository (Shodhganga) does the metadata harvesting from all such geographically distributed university ETD repositories. This serves as the backbone of research infrastructure by facilitating unified access to theses and dissertations through its harvesting server. Universities hosting ETDs on their own repository must draft and enact suitable IPR policy pertaining to the doctoral theses.

Shodhganga has 167741 full-text ETD items as on September 24, 2017.

WEBOMETRICS

Webometrics which is also referred to as cybermetrics on occasion, tries to measure the World Wide Web to get knowledge about the number and types of hyperlinks, the structure of the World Wide Web and usage patterns. Webometrics refers to a set of quantitative techniques to track and evaluate the impact of websites (and other online sources of information). Webometrics is evolved from Bibliometrics and it covers the concepts of Scientometrics and Informetrics. Link structure

Figure 3. Software used for Indian ETD repositories



analysis and web technology analysis are the core areas of webometrics. Almind and Ingwersen (1997) coined the term webometrics. According to them, "the application of informatics methods to World Wide Web (WWW) is called webometrics". Webometrics is the approach which covers research of all network-based communication using infometrics or other quantitative measures. Later, Bjorneborn and Ingwersen (2001) outlined a concept which paved a new direction in webometrics for performing knowledge discovery and issue tracking on the web, partly based on bibliometric methodologies used in bibliographic and citation databases. Bjorn and Ingwersen (2004) gave a definition for webometrics, "it is the study of quantitative aspects of the construction and use of information resources, structures and technologies on the web employing on bibliometric and infometric approaches". Mike Thelwall (2009) defined webometrics as "the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study". This particular definition is focused on the concept of development of applied methods for use in the wider social sciences to help in publicizing appropriate methods outside of the information science discipline rather than to replace the original definition within information science.

RESEARCH METHODOLOGY AND RESEARCH INSTRUMENT

The Shodhganga repository website can be accessed anywhere and anytime, thus helping in increasing the visibility of the research and the researcher. In this study, the evaluation of the Shodhganga website has been done using a web analyzer which is one of the techniques of webometrics. Web analyzers evaluate those indicators which cannot be evaluated by human eyes. Thus, they help to get in-depth insights into the performance of the website. Like web indicators, web analyzers also assist in optimizing site performance by eliminating navigational bottlenecks, identifying best sources of acquisition and helping to gauge traffic. They also provide a list of errors that are detected on web pages, get valuable reports and statistics about the websites. There are a number of online software programs to evaluate websites. They keep a track on the websites and their problems. They also investigate backlinks, broken links, external and internal links, page speed, load time, mobile compatibility, domain age, keyword consistency, Search Engine Optimization (SEO) tools, hit counts, etc. (Web Analytics Definitions - Digital Analytics Association, 2007).

Research Instrument

Some of the web analyzers used for website analytics are GT Matrix, Nibbler, Ahrefs, Woorank, Sitebeam and etc. In the present study, Nibbler has been used to analyze the website of Shodhganga. Nibbler is a free web analyzer for testing websites which keeps a track on the website and their problems. It is a 'bot' an automated computer program which tries to find web pages. It evaluates the website on 18 different tests and provides Web Analyzer Test Score (WATS). First 5 pages of Shodhganga were tested on 23 September 2017. Each parameter/indicator is scored based on well-defined criteria on a scale from 0 to 10. The final overall score is calculated from an average of the individual scores assigned to each page, weighted by their respective importance.

RESULTS AND DISCUSSION

Code Quality

The first thing a website visitor notices on a website is its design which represents the objectives, branding, and marketing strategy of the organization. While the design is visual, the code that actually makes a website live (HTML, CSS, PHP) is behind the scenes and out of sight. Though good design is easier to observe than good code, for a successful website it is essential that the code should be of the same level of quality as the design itself. The findings of the webometric test revealed that Shodhganga ETD portal scored poorly (0) in code quality. The test highlighted 214 errors in 5 pages tested by Nibbler. No pages were found to be W3C Compliant as there are errors in the code and some web browsers may not be able to read the Shodhganga website.

Facebook Page

The National ETD Repository website scored 0 in Facebook Test. This website does not appear to be associated with an official Facebook page. This website was found to contain some links to Facebook, but none appear to be public Facebook pages associated with this website.

Twitter

The website scored 0 in Twitter Test. Shodhganga does not appear to be associated with an official Twitter account.

Analytics

Web analytics is the measurement, collection, analysis and reporting of web data for the purpose of understanding and optimizing web usage. It delivers a wealth of information about website, visitors and their behaviour facilitating the organization to take measures based on organizational and user goals to improve website's performance and users' experience. Shodhganga ETD repository runs on DSpace platform. As of DSpace version 5.0, it has become possible to expose the recorded Google Analytics data within DSpace (DSpace Google Analytics Reporting). However, Shodhganga ETD repository scored (0) under the **a**nalytics test as it was not found to be using recognized analytics solution. The webmaster should make sure that the tracking codes should be included on every page of the website. Without analytics tools it is difficult to find complete visitor analytics and to take an evidence-based measure for website improvement.

Meta Tags

A meta tag is an HTML tag containing information for search engines about a specific website. Meta tags contain keywords or phrases alerting search engines of a website's content to be included in search results for users requesting related information (Adding Meta Tags to Your Website, n.d.). The importance of meta tags is that the search engines read them in order to compare if these keywords and the description are related to the visible content (Adding Meta Tags to Your Website,

n.d.). Shodhganga ETD repository website got only 2 points out of 10. All pages include at least some metadata but no pages have a description meta tag. The description metadata is important as it appears on Google's search result pages (SERPs).

Freshness

Fresh content has a positive influence on search engines and website user experience (UX). Conversely, a stale website can actively deter users as outdated websites have a negative impression of the website and its brand. To keep the website "fresh", it requires content to be added on a regular basis, both to expand the amount of content at a steady rate and to stay current with recent developments.

Users are engaged by content that is new. In particular, fresh content is more likely to be shared socially and flourish virally (Check how up-to-date any website is, n.d.)

Essentially it examines how a human being might react when looking at a website.

This test (Figure 4) has scored 8 points out of 10. Shodhganga was found to be updated last time on September 1, 2017 at the time of study. Frequent and timely updating of the website is necessary for the users as these websites are also searched by search engine more often.

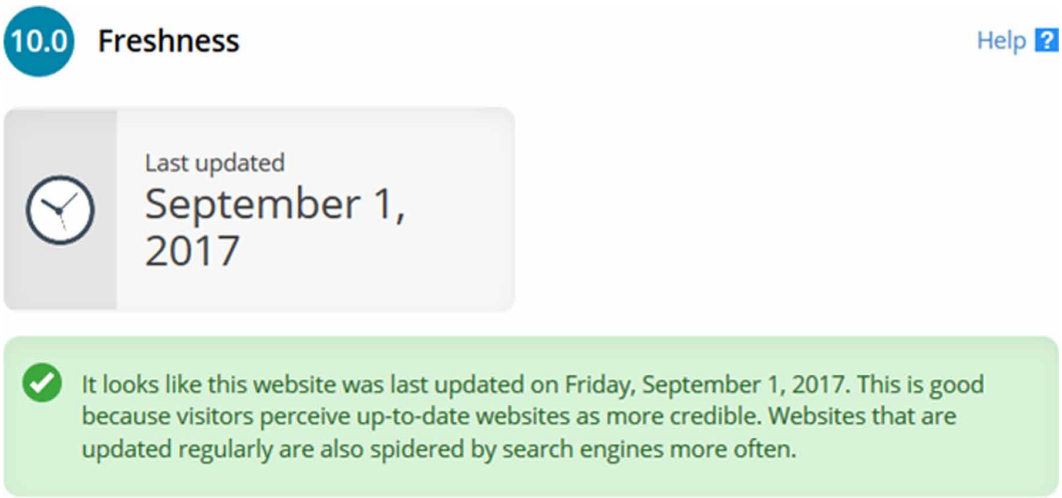
URL Format

In particular, good URLs are easier to email, memorise, advertise and guess. Shorter and clean URLs also tend to score higher in search engines. A site's URL structure should be as simple as possible. Website content should be organized in such a way that URLs are constructed logically. Overly complex URLs can cause problems for crawlers by creating unnecessarily high number of URLs that point to identical or similar content on the site. As a result, Googlebot may consume much more bandwidth than necessary, or may be unable to completely index all the content on your site (Keep a simple URL structure - Search Console Help, n.d.). Shodhganga website scored 6.4 points out of 10. This test checked whether the format of URLs on its website is appropriate. Proper URLs are easy to remember and will not be vulnerable to hacker attacks easily.

Server Behaviour

There are many ways to improve the efficiency of a website and how it's treated by search engines, by configuring the website's server settings. Shodhganga website scored 6.7 points out of 10 in this aspect. This test shows the efficiency of the website. This website handles missing pages correctly by

Figure 4. Freshness web indicator



sending 404 HTTP status code. It has not used GZIP encoding. GZIP encoding is widely supported and reduces the load time of a webpage.

Amount of Content

This test scored 7 points out of 10. This test checks to see how much content is on a web page. The amount of content shown to strongly correct with the website's rank in search engines. A website should have sufficient quantity of good quality textual content (Figure 5).

The Shodhganga webpage featuring ETD contributions of the individual Universities and Departments (available at http://shodhganga.inflibnet.ac.in/community-list) has 24744 words. As per Nibbler, Shodhganga has an average of 639 words per page.

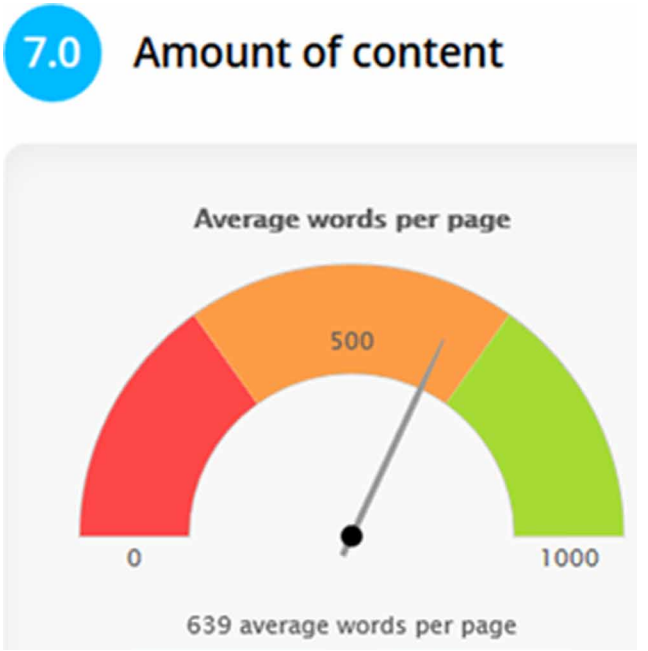
Images

It is important to include the width and height attributes in each image tag. This helps the visitor's web browser to understand how much space is to be left for the image until it is downloaded. Ignoring image attributes leads to increase in page load time. Image dimensions should not be stretched to avoid page load, rather they should be identical to the actual dimensions of the image. (Nibbler - Test any website, n.d.). Shodhganga webpage scored 8 points out of 10, which can be seen as a good score.

Social Interest

Social media is increasingly displacing search as the primary means of reaching and promoting websites. High social interest suggests value and is a form of social proof. Conversely, low social interest suggests low value. Nibbler measures the website social interest based on the number of Facebook likes and Tweets for each page in the website. The higher the number of likes and tweets the website attracts, higher is the social interest score. The social interest score of the Shodhganga ETD repository was found to be 7.5 which is moderately balanced. More visibility of Shodhganga should be there on social sites to maintain the high score.

Figure 5. Amount of content web indicator



Headings

Search engines use the headings to index the structure and content of web pages. Users skim webpages by reading its headings. It is important to use headings to show the document structure. Headings communicate the organization of the content on the page. Web browsers, plug-ins, and assistive technologies can use them to provide in-page navigation. Shodhganga ETD repository website has done well in this regard. It has scored 9 points out of 10. Most of the headings of Shodhganga are correctly defined. Well-defined headings aid accessibility and are particularly important for search engine optimization.

Website Popularity

Under this test, the Shodhganga ETD repository did extremely well (9.6 out of 10). Nibbler uses Alexa for checking the popularity of a particular website along with comparing its popularity with other websites. It also tests whether popularity is rising or falling. Shodhganga scored 9958th rank in the world as per Alexa. Shodhganga accounts 87% of internet traffic to inflibnet.ac.in and its other sub-domains. Theses, which earlier formed a crucial part of grey literature with closed or restricted access, got wings with the emergence of ETDs under the conducive environment offered by the Open Access (OA) Movement. The high popularity of Shodhganga can be safely attributed to the open access to the ETDs available 24/7. The high popularity of Shodhganga website is in concurrence with its high social interest score (7.5).

Printability

Printability test determines if the website is suitable for printing. A well-built website will have a separate print stylesheet linked in the head of the document. The print stylesheet should include a style which improves the appearance of the content when printed out. Shodhganga ETD repository obtained the maximum score i.e. 10. This is of significance for the research scholars and others who are interested in taking the printout of the theses partially (of selected pages or chapters). The high score can be attributed to the fact that the theses in the ETD repository powered by DSpace, are available chapter wise as PDF files, which are easy to read and print.

Internal Links

Internal Links are hyperlinks that point at (target) the same domain as the domain that the link exists on (source). An internal link is one that points to another page on the same website. Internal links allow users to navigate a website, help establish information hierarchy for the given website and help spread the ranking power around websites. Shodhganga ETD portal scored full points i.e. 10 thus allowing search engines to index its content better.The high score is of great value here as Google uses these links to find out what content on site is related and what the value of that content is.

Mobile

There are more mobile Internet users than desktop Internet users (Stevens, J., 2017). There are 3.5 billion global mobile Internet users as of August 2017. People the world over, have started spending more and more time on their mobile devices and tablets, but many websites still aren't designed to account for different screen sizes and load times. The mobile-friendly website refers to a site that displays accurately between your desktop/laptop computer and a mobile device such as a handheld phone (iPhone, Android, Blackberry) or tablets (iPad, Kindle, Galaxy, etc.). Mobile optimization (Figure 6) takes a look at site design, site structure, page speed, and more to make sure it does not inadvertently turn mobile visitors away.

Library websites also need to tweak their websites so as to make their websites mobile friendly, develop the mobile version of their websites and go for mobile optimization. Mobile optimization will ensure that visitors who access the site from mobile devices have an experience (UX) optimized

Figure 6. Mobile interface web indicator

for the device. Under this test, the ETD portal got the maximum test score of 10. Thus, it was found that the Shodhganga ETD portal is optimized for mobile devices. All the pages of the website are optimized for viewing on a mobile phone interface as well.

Incoming Links

A backlink, or inbound link, is a link coming from another site to own website. Some other names for backlink are incoming link, inbound link, link, inward link, and citation. Backlinks tell search engines that the website is an authoritative source on a certain subject/area. The right backlinks can drive referral traffic from another website traffic to parent website. Inbound links are the "currency" of the internet, and a website rich with inbound links will naturally rank better in Search Engine Results Pages (SERPs). Shodhganga ETD portal also has inbuilt Google search facility. It scored full points i.e. 10. in this segment. There are 1399778 pages on 2012 domains linking to Shodhganga. The volume and quantity of incoming links are known to influence a website's search engine ranking positively.

Page Titles

A title tag is an HTML element that specifies the title of a web page. Title tags are displayed on search engine results pages (SERPs) as the clickable headline for a given result and are important for usability, SEO, and social sharing. The title tag of a web page is meant to be an accurate and concise description of a page's content. Writing good page titles is an essential skill as the title tag is the first thing a user sees in the search results. It's also one of the most important factors for Google to decide what the topic of a page is. The combination of these two factors makes it essential. Page test checked whether page titles are used on the website correctly. In this, the ETD portal has scored perfect 10. A page title exclusively refers to the 'Title' tag of a page. All the pages were found to

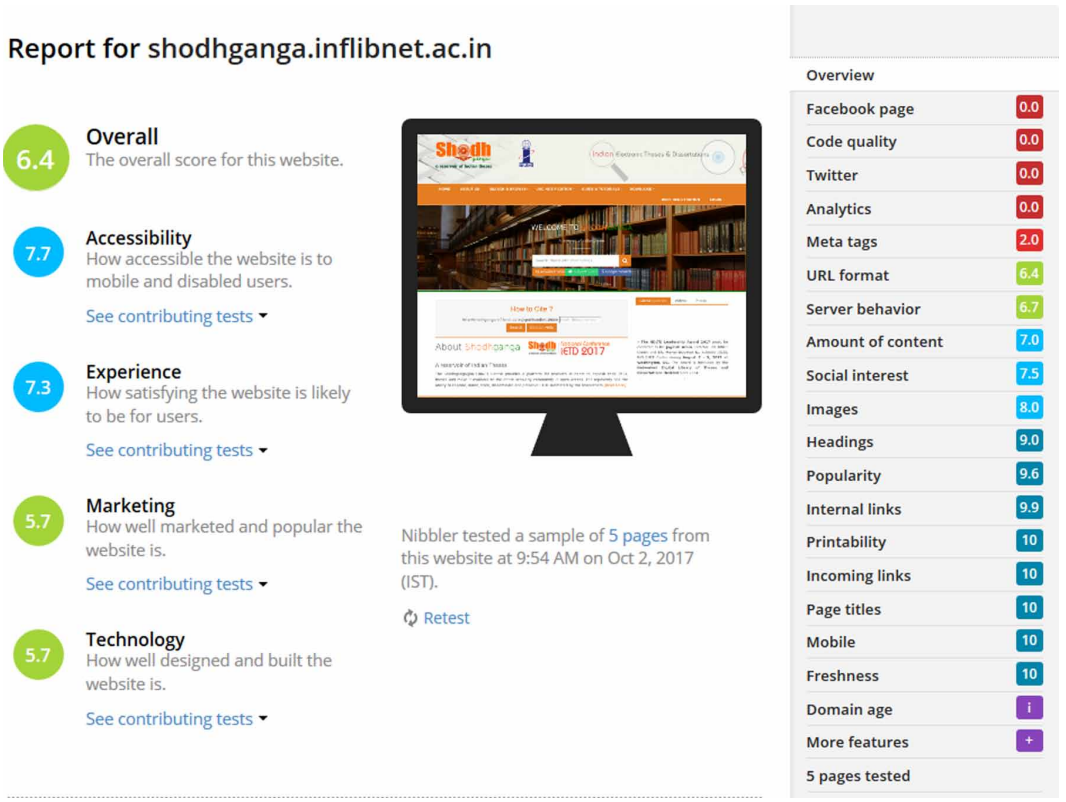
be using page titles appropriately. Page titles appear in search engine results and at the top of the browser's window when visiting the site. A re-test using Nibbler was conducted on 2nd October 2017. The results (Figure 7) were found to be the same (overall score = 6.4).

RECOMMENDATIONS

Based on the findings of the study following recommendations may be considered for enhancing the quality of service and user experience (UX):

- Libraries should undertake user surveys to obtain first hand feedback regarding the usefulness and relevance of the library website. The survey could be questionnaire based (may be embedded on the website itself) or librarians may conduct focus group interview to get users' viewpoint.
- The database interface (UI) should be redesigned keeping in view the user ease of use, easy information retrieval with high recall and precision.
- The portal should be mobile friendly and the same should be accessible using mobile app.
- A good starting point for the portal developers could be the Web Content Accessibility Guidelines (WCAG) under the Web Accessibility Initiative (WAI) produced by the World Wide Consortium (W3C), with a goal to improve web content accessibility including people with disabilities.
- The MoU signed between the participating universities (responsible for submitting ETDs into the repository) should mandate them to add a link to the service promptly and suitably on their website. This will ensure easy discovery while maximizing usage.

Figure 7. Re-Test done on 2nd October 2017 gave almost similar test results and score



- The ETD portal should highlight the theses download statistics like the top ten downloaded theses along with their disciplines.
- Social media tools including library blog, twitter may be used for the effective marketing of the service.
- A sustainable and reliable technology upgrade plan must be adopted to enhance the efficacy of the system.
- Whenever available the platform may be migrated to the latest software version.
- The pre-submission plagiarism detection process should be strengthened, and a viable monitoring mechanism must be evolved for its compliance.
- For scanning the theses written in native/local/vernacular languages, plagiarism detection softwares with Unicode support is recommended.

CONCLUSION

The analytics result shows that, in five parameters, the performance of the Shodhganga ETD portal was very poor (zero in four of them). In rest of the test parameters, it has done fairly well (mean score = 6.4). In fact, in five of the parameters, it has scored a perfect ten. The test results reveal that the ETD portal has received a good score in Accessibility (7.7) and User Experience (7.3) while scoring low in the domains of Marketing (5.7) and Technology (5.7). The mammoth task of enriching the ETD repository with hundreds of thousands of full text doctoral theses and dissertations has been accomplished.

All measures will have to be taken to envisage the essence of service by strengthening the technological aspects coupled with marketing initiatives so that there may be maximum utilization of the research output.

The Shodhganga ETD is made use of by Indian and foreign research scholars. The easy availability to the immense number of original research works is astounding and needs to be emphasized by academics. The knowledge made available by Shodhganga is a boon not just to researchers, but to all knowledge-seekers. Based on the test results on the website of Shodhganga, we can identify where the weaknesses and strengths of the website lie. Accordingly, INFLIBNET could rectify what needs to be rectified, and thus provide scholars with a better user experience which will be more satisfying and enriching for them. It has been found that the website scored least in Marketing and Technology, making it clear that the website needs to be actively promoted across social media platforms, and given a presence in such social websites. When the website for India's doctoral research is improved upon and made more pleasing, this benefits one and all the knowledge sector.

Web analyzers are underrated tools which can be used to examine the strength of any website. The present study employed the web analyzer Nibbler to great effect and was able to provide in-depth understanding to the quality of the Indian ETD Shodhganga's website. The data sets made available by web analyzers is evidence to the extensive study run by them on websites. There needs to be more studies on relevant websites by using web analyzers across different disciplines and sectors. The findings of the study may be useful for the readers and practising librarians to evaluate, assess and improve the status of similar projects by using webometric analysis. It will also go a long way to tweak the weaker areas of the national ETD repository of India i.e. Shodhganga.

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