

## Webometric Analysis of Private Engineering College Websites in Tamil Nadu

S. Thanuskodi

*Library and Information Science Wing, Directorate of Distance Education,  
Annamalai University, Annamalai Nagar 608 002, Tamil Nadu, India  
E-mail: thanuskodi\_s@yahoo.com*

**KEYWORDS** Webometrics. Bibliometrics. Internet. Information Resources. Higher Education. Private Engineering College Websites

**ABSTRACT** It has been experienced that web-based information resources have great role to play in academic and research activities. Keeping this fact in view, information professionals are largely depending upon the web-based information resources. A huge amount of data in every subject stream is available on different websites. Internet is a network of networks carrying information on almost any subject under the sun. Everybody today would like to be on the internet because of the wealth of information that lies there to be exchanged. And, with its global connections and millions of users, the internet is the world's biggest electronic library and public gathering place, which contains a vast amount of information. Information professionals and users face a number of challenges in networked information resources and service environment. But problem is only one that how to retrieve desired information. Many attempts have been made and the solution seems to be 'webometrics'. In this paper an attempt has been made to describe this concept.

### INTRODUCTION

The different metrics studies such as librmetrics, bibliometrics, scientometrics and informetrics are well known and used to measure scholarly communication; identify research trends and growth of knowledge; identify users of different subjects; estimate comprehensiveness of secondary periodicals; forecast past, present and future publishing trends; identify authorship and its trends in documents on various subjects; measure productivity of publishers, individual authors, organisations, country or that of an entire discipline. Bibliometrics research methodologies of library and information science have always been used to provide tools for understanding the dynamics of disciplines, developing policy and justifying research funding. Since 1996 increasing efforts have been made to investigate the web as a significant scholarly medium for science and scholarship by applying bibliometrics techniques (Larson 1996). Terms applied to this new area of study include "webometrics" (Almind and Ingwersen 1997) and recent years have witnessed the emergence of webometrics or cybermetrics. Webometrics covers research of all network-based communication using informetric or other quantitative measures. In the wake of globalization, the planners and top administrators are giving emphasis to revise the strategies in the higher education to cope up with the changing paradigm,

redefining the education system to compete with the global requirements. The globalization has made a remarkable impact on academic education system and internet is the constant source of energy for the institute to make its facilities and opportunities available globally.

In order to achieve the goal, there is a need to have websites of each academic institute in order to perform well and stay in the competition. People come to a website to get information. Therefore, the primary goal of the universities' website is to provide information to its users. Prospective students may use university website for choosing for their admission, to find out a particular course offered. Current students may look for semester examination schedule and results. Some students may download application form and prospectus. Some teacher may search for job vacancy and benefits. University websites are increasingly used for wide variety of purposes like attracting new students, online library catalogue. In the case of research, university website can announce existence research and promote individual achievement of individual, research group, departments and institutions as a whole.

Therefore, there is a high requirement to know the web presence of universities in general and Indian universities in particular. It is also required to measure the web impact through various WIFs using appropriate webometric indicators in order to enhance its efficiency

through optimizing web content, analysis and re-designing. Ingwersen (1998) proposed the concept of Web Impact Factor (WIF) to measure the impact of website. Most studies in the web impact of academic web sites have been carried out for data sets of university websites or department websites for departmental inter-links. The relationship between web impact measures and other measures like hyperlinks to organizations and research performance through peer-reviewed ratings or publication impact Thelwall et al. (2003), Tang and Thelwall (2003) and Thelwall (2001). Although some studies reflect that there is no significant correlation between general WIF and research rating for Australian universities (Smith 1999) but Thelwall (2002) showed that there is a high correlation between research ratings and four different WIFs calculated from several source domains for UK universities. The web presence can be measured with the help of search engine's advanced facilities. Here, we have taken the help of Yahoo!, AltaVista and Google wherever required. The webometric analysis can be performed through a number of webpages, number of rich files, number of inlinks and self-links. It can also be appropriate to see the number of internet users, percentage of literacy, number of hosts, ICT literate and high-speed broadband facilities. Since students, teachers, institutions, government and general public are interested to know the rankings of universities. Academic websites in a country are the most important internet communication tools. They introduce universities, their related institutes and departments, their resources and services, faculty members, student, alumnae and others. Nowadays, an important factor for the success of a university is its website and web accessibility and in particular its visibility on the web (Babu et al. 2010).

### **Comparative Study of Bibliometrics and Webometrics**

The reason behind this comparative analysis is to describe the similarities and differences between both. The webometrics is a new concept with increasing dimension and based on bibliometrics (a well established phenomenon), but some part of webometrics study is beyond the boundaries of bibliometrics. So the comparative analysis is based on the definition of webometrics.

The definition of webometrics includes four parts: 1. Web page content analysis, 2. Web link structure analysis, 3. Web usage analysis (for example, exploiting log files for user's searching and browsing behavior), and 4. Web technology analysis (including search engine performance). If we elaborate the first point 'web page content analysis', we will find that it includes the content of home page of a particular website. It shows that what type of information is available on that web site. Like the very same we can also perform the study of books/literature through bibliometrics for their content analysis.

Second point is web link structure analyses. The link structure includes "inlinks" and "outlinks". Inlinks are the links, which are used to connect the pages of the same website. As the term binding is used for a book, in the very same way the term inlink is used for the website. On the other hand, outlinks are the links which connects a website with other, of the same subject. To better understand this term, we can compare it with the references/bibliographies given in a book. If the pages of a website are not properly linked, one can't properly access the website. Just like the above the links of the book can be said as the references or bibliographies and these may be measured as bibliometrically.

The third point is 'web usage analyses. Through this analysis anyone can know, how users are using the web. Log files are the good source for this analysis. Log files records the request sent to a web server by user, browsers and can be mined for useful information about how they are using the site. Figure 1 is helpful to know the procedure of communication between web browser and web server (Walia, 2008). The principle drawback from a webometrics perspective is that log files typically cover one site/or all sites owned by the same server, and so they are generally not a good data source for studying all web server all together. In the same way we can also do 'library usage analysis' or the like though bibliometrics in the library users search materials/information via asking questions, via catalogue, through library software or the like. After collecting this type of information one can generate information, on how much library searching materials are authentic and the defaults can quickly be removed.

The fourth point is 'web technology analysis' (search engine performance). Technology

is a term, which denotes the quality. The above point includes search engine performance, because search engines are such type of websites, which incorporate more technology than other web sites. The result of search engine comes as the big list of URL's of different website of a particular subject. In short, it can be said that technology itself is a very broad phenomenon but as far as webometrics study is concerned, it is measurable and a useful study tool for web based study. But the bibliometrics study is totally based on mathematical formula and quantitative statistical method, and the web technology is totally a different phenomenon. So this part of webometrics study is beyond the boundaries of bibliometrics. Thus, it can be said that, on the basis of origin, the bibliometrics is the base of all other metrics. But every type of metrics has some unique features, which differentiate between all of them.

#### Relationship between 5 Metric Sciences (I.B.S.C.W.)

Between these five metrics sciences bibliometrics first came in existence in 1969. It is the statistical analysis method of publication pattern and the like. The other metric sciences: infometrics, scientometrics, cybermetrics and webometrics, are also statistical methods and have their origin on the basis of bibliometrics. But all of them have their different subject areas. Before defining the relationship, it's essential to define all the terms. Here the terms are defined as the stub (in short).

1. *Infometrics*: the study of quantitative aspect of information in any form.
2. *Bibliometrics*: the study of quantitative aspect of production, dissemination and use of recorded information.
3. *Cybermetrics*: the study of quantitative aspect of internet as a whole.
4. *Scientometrics*: the study of quantitative aspect of science as a discipline or economic activity.
5. *Webometrics*: the study of quantitative aspect of web/web site.

In Figure 1 the circle of infometrics covers all other metrics circles, because according to stub (given above), it is a quantitative aspect of any type of information. The part, which overlaps the circle of bibliometrics, of scientometrics, shows the politico-economical aspects of scien-

tometrics. The economic aspect of science shows the impact of scientific research over the society. Bjorneborn (2004) and Ingwersen have proposed a differentiated terminology distinguishing between studies of the web and studies of all internet applications. They use 'webometrics' for study of web and 'cybermetrics' for study of internet applications. Some part of cybermetrics ellipse lie outside the bibliometrics. It is because some activities in cybermetrics normally are not recorded, but communicated synchronously as in chat rooms. In Figure 1 the circle of webometrics overlap the circle of bibliometrics, but within the boundaries of cybermetrics. Webometrics circle can't overlap the circle of cybermetrics because web is a part of cyberspace. But in Figure 1 the circle of webometrics ellipse lying outside the bibliometrics, because some aspect of webometrics (link structure, technologies and so on), is not included in bibliometrics or it is beyond the boundaries of bibliometrics.

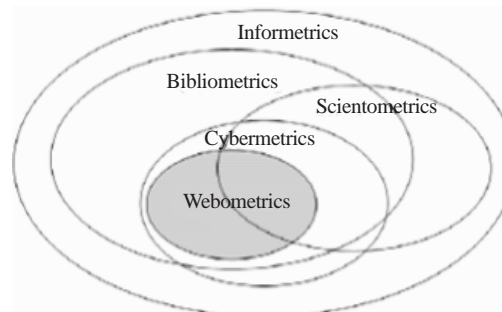


Fig. 1. Relationship diagram of 5 metrics –infor/biblio/sciento/cyber/webometrics (after Walia 2008)

#### Higher Educational Systems in India

The domain of higher education in India operates through nearly 20,676 colleges affiliated to over 400 universities. There are more than 11.5 million students, along with faculty members both at the colleges and universities. The University Grants Commission (UGC) is a statutory organization established by an Act of Parliament in 1956 for the coordination, determination and maintenance of standards of university education. Apart from providing grants to eligible universities and colleges, the Commission also advises the Central and State Governments for the development of higher education. Besides, All India Council of Technical Educa-

tion (AICTE) and National Assessment and Accreditation Council (NAAC) are also working hard to render the quality education by implementing various quality improvement techniques and measures.

#### ***State Universities***

State level universities are setup by an act of State Legislature. As per section 12(B) of the UGC Act, State Universities established after 17th June, 1972 shall not be eligible to receive any grant from the Central Government, UGC or any other Organization receiving funds from the Govt. of India, unless the Commission satisfies itself, as per the prescribed norms and procedures, that such a university is fit to receive grants. There are 181 State Universities in India.

#### ***Central University***

There are 23 Central Universities under the purview of Ministry of HRD, created under Acts of Parliament.

#### ***Deemed University***

There are total 150 Deemed Universities in India as of March 2009 out of which the list of 124 universities is mentioned in the UGC website and remaining from other websites such as educationobserver.com. An institution of higher education, other than universities, working at a very high standard in specific area of study, can be declared by the Central Government on the advice of the UGC as an Institution 'Deemed-to-be-university'. Institutions that are 'deemed-to-be-university' enjoy academic status and privileges of a university. There are 20 National Institute of Technologies (NITs), which have been considered as Deemed Universities.

#### ***Institute of National Importance***

All Indian Institute of Technologies are coming under the purview of institute of national importance. There are 24 universities are under the category of Institute of National Importance. The institute of national importance includes all IITs (including new IITs), IIMs and some other universities declared as national importance by UGC.

#### ***Distance Learning***

Due to huge population pressure in India there is over burden for the higher educational institute to accommodate the need of the people. Therefore, Open and Distance Learning (ODL) system is necessary for the country to set up a system wherein teachers and learners need not necessarily be present either at the same place or same time and is flexible in regard to modalities and timing of teaching and learning as also the admission criteria without compromising necessary quality considerations. ODL system of the country consists of State Open Universities (SOUs), Institutions and Universities offering education and includes Correspondence Course Institutes (CCIs) in conventional dual mode universities. There are 13 open universities, one national open university and many more dual universities in the distance educational system.

#### ***Review of Literature***

The science of webometrics and the study of links created between web pages try to determine a model for scientific usage of the web and also information resources with highest impact on the web using the new calculating methodologies to measure in links of the web pages (Vaughan and Thelwall 2003). In fact, webometrics is a science based on informetrics methods, which studies the nature and characteristics of websites. In this science, the content analysis of web pages are performed through calculating and analyzing their outlinks and inlinks. The ratio between the external inlinks received by a website and the number of web pages comprising that website is called web impact factor (WIF), which reflects its global fame as well as the quality of information resources it provides. The concept of WIF was introduced first on 1997 by a Spanish researcher, Rodriguez Gairín (Rodriguez and Gairin 1997). The basic idea of this concept came from Journal Impact Factor (JIF) which was introduced by Dr. Eugene Garfield in 1960s and used by the Institute of Scientific Information (ISI) to select the scientific journals for citation indices ever since (Garfield 1999). WIF is an indicator to measure and compare efficiency, attractiveness, and success of websites in a broad level such as country domains or a limited level such as academic

websites. Absolute WIF or External WIF is the ratio of external inlinks to the web pages indexed by search engines. Since mid- 1990s, there have been efforts to study the structure and characteristics of the web by itself, web contents and links and also web search engines using new informetrics methodologies. Several studies show that web sites can be compared and ranked in different domains based on their impact factor. Ingwersen (1998) calculated the WIF for some Danish domains and websites. He used AltaVista for his study because he believed this search engine covers a broad area of the web and provides sufficient information for webometrics studies. Jeyshankar and Ramesh Babu (2009) conducted a study on Tamil Nadu universities where they examined and explored the websites of 45 universities in Tamil Nadu comprising 27 state and 18 private universities. They found that that some universities in Tamil Nadu have higher number of web pages but their corresponding link pages are very small in number and the websites fall behind in their simple, self link and external link WIF.

Mukhopadhyay (2004) studied the WIF for SAARC (South Asian Association for Regional Cooperation) countries as well as the sub domains of academic and research institutions in India. He believed that because of the hierarchical structure of the web, WIF should be calculated in three levels and also believed that well known search engines such as Alltheweb, AltaVista, and Hotbot can be used for data gathering and calculating WIF in each of the above mentioned levels. In another study, two types of websites in Australia were compared: Australian universities websites and Australian electronic journals. Analysing the results of his study, the author concluded that the WIF is an appropriate indicator to measure the general impact of large institutions such as universities and research institutes, but it is not reliable to evaluate websites with small content volume such as electronic journals (Smith 1999). Smith and Thelwall (2002) studied the WIF for the Australian Universities' websites. Counts of links into the websites of Australasian universities were calculated from the output of a specially designed crawler that covered universities in the UK, Australia and New Zealand. These figures were compared to those from the commercial search engines such as AltaVista and AlltheWeb. WIFs for Australasian univer-

sities were then calculated by dividing link counts from the three countries by academic staff numbers at each target university. Smith and Thelwall (2002) concluded that AltaVista and AlltheWeb search engines could find more domains and links compared to other Internet search engines and they are also more accessible and easier to use.

The world universities are ranked based on their academic and research performance every year by some reputable centres such as the Institute of Higher Education, Shanghai Jiao Tong University (IHE SJTU). The result of this ranking, published annually as Academic Ranking of World Universities (ARWU), is of international importance (Aminpour 2006; ARWU 2011). Abrizah et al. (2010) highlighted the web performance of Asian institutional repositories through global visibility and performance of Asian top ranked universities in the archiving and sharing their research output through institutional repositories, based on the Ranking Web of World Repositories (RWWR). Their findings signify Japan as the biggest contributor of Asian repositories, followed by India and Taiwan. It shows that only 48 of them are listed in the Top 400 RWWR. This implies that only 12% of Asian institutional repositories are visible and incorporate good practices in their web publication as extracted from the quantitative webometrics indicators used by the ranking. It is suggested that if the web performance of an institutional repository of a research institution is below the expected position, the university authorities should reconsider their web policy to increase the volume and quality of their intellectual output / research publications through institutional repositories.

Islam and Alam (2011) conducted a study on webometrics, especially on the impact of websites and the web impact factor. The present study analysed the websites of private universities in Bangladesh according to the webometrics indicator. It examines and explores the 44 private university websites in Bangladesh and identifies the number of web pages and link pages, and calculates the Overall Web Impact Factor (WIF) and Absolute Web Impact Factor (WIF). In a cross-sectional study, all the websites were analysed and compared using AltaVista search engine. The websites were then ranked based on these webometric indicators. The study revealed that some private universities in Bangla-



desh have higher number of web pages but their link pages are very small in number, thus the websites fall behind in their Overall WIF, self link, external links and Absolute WIF. Finally, it is showed that these universities did not have much impact factor on the web and were not known internationally. The major reasons are discussed and suggestions to overcome the problems are presented.

### Objectives

This is an analytical descriptive research carried out as a cross-sectional study. The primary objective of this study is to calculate the web impact factor of the private engineering colleges in Tamil Nadu. Specifically the objectives are:

- a) To identify and analyse the websites of selected private engineering colleges in Tamil Nadu.
- b) To calculate the number of web pages, number of link pages, number of self link pages and external link pages of the private engineering colleges in Tamil Nadu and rank them by number of web pages and WIF.
- c) To calculate the overall Web Impact Factor (WIF) of private engineering colleges in Tamil Nadu.

### Private Engineering College Websites

Websites have become powerful means of communication. A website is a collection of related web pages, images, videos or other digital asserts that are addressed with common domain name or IP address in an internet protocol based network. A website is hosted on at least one web

server, accessible via, the internet or a private local area network.

The growing use of internet in libraries and advent of webpage revolutionized the process of library publicity and dissemination of information pertaining to library sections, collections, staff and services. Private Engineering College website can disseminate a wide range of information to user community and staffs through development and maintenance of its library homepage. The home page of association website can be updated as and when desired. The private engineering college home page should be aesthetic, well designed and should include all important information pertaining to engineering college. It should include the details of chairman, principal and faculty members. And also include course details, library collection and services, programs conducted and hyperlink to a notice board for important announcement and notices, circulars pertaining to students and faculty members. Forms of admission can be loaded on homepage so that they may be printed by users admission from their desktop, filled up and sent to college online. It should also provide hyperlinks to important documentation and information centers which maintain their web pages on internet. Home page provides all necessary information regarding the college, programs and library. Users connected with internet can have this information at any time and form anywhere in the world. The websites considered for this study were given in Table 1.

### Scope and Limitations of the Study

Engineering education in India has seen tremendous growth over the past decade, both in

**Table 1: General information about colleges under study**

<i>S. No.</i>	<i>Name of the college</i>	<i>Abbreviations</i>	<i>Website address</i>
1	Sri Sivasubramaniya Nadar College of Engineering, Kanchipuram	SSNEC	www.ssn.edu.in
2	Sri Venkateswara College of Engineering, Sriperumbudur	SVCE	www.svce.ac.in
3	RMK Engineering College, Chennai	RMKEC	www.rmkec.ac.in
4	Kumaraguru College of Technology, Coimbatore	KCT	www.kct.ac.in
5	St. Joseph's College of Engineering, Chennai	SJCE	www.stjosephs.ac.in
6	Velammal Engineering College, Chennai	VEC	www.velammal.org
7	Sri Krishna College of Engineering and Technology, Coimbatore	SKCET	www.skcet.ac.in
8	Sri Sairam Engineering College, Chennai	SSEC	www.sairam.edu.in
9	Sona College of Technology, Salem	SCT	www.sonatech.ac.in
10	MNM Jain Engineering College, Chennai	MNMEC	www.mnmjec.ac.in
11	Easwari Engineering College, Chennai	EEC	www.srmeaswari.ac.in
12	Panimalar Engineering College, Chennai	PEC	www.panimalar.ac.in
13	Bannari Amman Institute of Technology, Sathyamangalam	BAIT	www.bitsathy.ac.in
14	Kongu Engineering College, Coimbatore	KEC	www.kongu.ac.in
15	Rajalakshmi Engineering College, Chennai.	REC	www.rajalakshmi.org

number of students and number of colleges, however the average quality of the colleges and graduated students has become suspect. A survey of human resource professionals at multinational corporations in India revealed that only one quarter of engineering graduates with a suitable degree could be employed irrespective of demand. Another survey of employers shows that only a handful of the 1400 engineering schools in India are recognized as providing world-class education with graduates worthy of consideration for employment. These results suggest that engineering degrees from most Indian colleges do not provide signaling value in the engineering labor market. Hence, low quality engineering schooling has come to predominate in the education market. The current situation, with an abundance of low quality engineering schooling, is considered objectionable by many in the Indian polity and is also projected to stifle growth of the Indian economy. It is our purpose to investigate the factors that lead to the current state of technical education in India and to suggest public policies that would rectify the situation.

Many of the engineering colleges in Tamil Nadu have gone in for hosting their own websites for advancement and betterment of professionals. This study is limited to fifteen engineering college websites in Tamil Nadu. Efforts have been taken to make the study as accurate as possible. Despite the limitations of time the investigators hope that the study will fulfill the objectives. The present study focuses on the webpage content analysis of engineering colleges and moreover study concentrates evaluation of contents and the link structures.

## OBSERVATIONS AND DISCUSSION

The number of links received by a college website shows its impact on the web and also the number of visitors it attracts. The present study calculated and compared the number of web pages, in links, external in links and also the overall and absolute WIF of private engineering colleges in Tamil Nadu. It covers active exclusive websites, compared and then ranked these universities according to webometric indicators. The present study chose Alta Vista because of its ability to cover a broader range of the web as opposed to the other commercial search engines. Moreover, some essential data

could not be retrieved via other commercial search engine like Google, Yahoo and Live Search at the time of the study. In fact, they could not process some of the main queries useful for webometric purposes (Statistical Cybermetrics Research Group 2000). Several webometric studies (Ingwersen 1998; Smith 1999; Mukhopadhyay 2004; Agarin and Nwagwu 2006) also report Alta Vista to be more reliable than other search engines. Alta Vista search engine indexes 3 web pages on the SCT website at the time of the study. These pages in general received 58 inlinks from which 2 were external. Since the WIF is calculated by dividing the number of inlinks to the number of web pages, it will be falsely high for new websites with few web pages. Therefore, the website of SCT with only 3 web pages was placed at the top of total private engineering colleges in Tamil Nadu. The WIF of SCT was 20.00. It is obvious that major private engineering colleges are in Tamil Nadu. Thelwall (2000) believes that calculating WIF of a domain by Alta Vista can be precise enough if the number of web pages in the website is relatively high. He suggests that before using a search engine for calculating WIF for a website, the high number of web pages in the same website should be ensured. Another factor that can increase the WIF of a university website is to make appropriate information resources easily accessible and usable for its users.

Electronic publishing and distributing engineering materials via an engineering website will attract more audiences and as a result the university website will receive more inlinks and get higher WIF. Thelwall (2002) studied 100 universities website of the UK and the results of his research showed that the highly linked pages are those that facilitate access to a wide range of information. Linguistic barrier is another factor affecting WIF. Other researchers also discussed that websites which provided non English web pages attracted less visitors and received less inlinks and therefore obtained lower WIFs (Noruzi 2006). The result of the study showed that in general the private engineering colleges in Tamil Nadu did not have much impact on the web and were not known at the international level, evident by the webometrics indicators low. The number of web pages, the number of accessible .ppt, .doc, .pdf, and .ps files, and also the academic rank of a university announced annually by credible academic world

rankings such as Institute of Higher Education of Shanghai Jiao Tong University, China and Times Higher Education, UK are considerable factors in the webometric ranking of universities. The policy makers of the private engineering colleges in Tamil Nadu and also the managers of their websites are not paying attention to these results. They are not familiar with webometric studies and benefits of improving web ranking.

Almost all the private engineering colleges in Tamil Nadu use ICT for managing the administrative processes and some are using ICT at a moderate level (Huda et al. 2009). As they are not aware of web ranking, they do not perceive its necessity to make websites active and rich in a way to be attractive and usable for students, professors, both in Tamil Nadu and global internet users. On the other hand, using traditional methods of publishing scientific productions and information resources in most of the private engineering college causes lower inlinks and WIFs. There are also language barriers. English speaking webmasters and authors rarely link to non English language literature. All the private engineering college websites in Tamil Nadu use English language, these websites may be less used. It is found from different reports, observations and visiting websites that some other reasons for the lower presence of the private engineering college websites in Tamil Nadu on the web are as follows: structural problems in web designing, providing few English web pages, limitation of access to the scientific resources, not indexing most of the private engineering colleges in Tamil Nadu by major search engines and web directories, the instability of web servers and inefficient web designs. The Open Access movement has not been openly embraced by most of the private universities, where the researchers probably have well established routines of publication in prestigious journals and see little benefit in alternative methods of access to the same material.

### CONCLUSION

Worldwide, library practices are undergoing revolutionary changes that stem from the proliferation of the internet and its features. Librarians can now effectively perform previously labor-intensive tasks over the internet using applications such as: (a) Electronic Mail (E-mail),

which librarians can use to communicate with colleagues and clients or participate in discussion groups and share experiences and ideas; all the while creating and monitoring discussion groups of interest to patrons; (b) Telnet, through which librarians can connect to remote computer resources and explore other library catalogs, access database services, and share resources; and (c) File Transfer Protocol (FTP) which librarians can use to obtain software programs, text images, and sound files. The present study focuses on the webpage content analysis of private engineering college libraries in Tamil Nadu and moreover study concentrates evaluation of contents not on the link structures and other research area in webometrics. It is found that general information about homepage features are more in PEC, EEC, SCT and lease in RMKEC and SJCE. Faculty members and librarian details are given by all the websites. The websites is up to date only in few engineering colleges remaining websites do not mentions time or date in the homepage. Webometric techniques are still in experimental stage in testing whether the classical bibliometric methods applied to the web are reliable and feasible means of comparing the analysis of websites.

### RECOMMENDATIONS

Based on the findings of the study, in this section an attempt has been made to suggest a few recommendations, which will help the web designer to make their website interactive, attractive and there by more user friendly. It will also be useful to users of engineering college website to evaluate its content, quality of information, design and organization of information. The present study made following recommendations for improvement of engineering college websites.

- Site map should be provided to view the overall functions easily.
- It shows majority of engineering colleges have not mentioned the date of update in their websites. The websites must be periodically updated and the date of updating should be indicated.
- Services play an important role in judging the performance of colleges. So engineering colleges should try to provide more services in order to energize the field.
- Feedback should be provided in order to remind the feedbacks of colleges.



## REFERENCES

- Agarin O, Nwagwu WE 2006. Links and Web Impact Analyses of Nigerian Universities. *Proceedings of the International Conference on Bridging the Digital Divide in Scholarly Communication in the South*, September 6-8 2006, Netherlands.
- Almind TC, Ingwerson P 1997. Informetric analyses on the world wide web: Methodological approaches to 'webometrics'. *Journal of Documentation*, 53: 404-26.
- ARWU 2011. Academic Ranking of World Universities, From <<http://www.arwu.org/index.jsp>> (Retrieved November 12, 2011).
- Abrizah A, Noorhidawati A, Kiran K 2010. Global visibility of Asian universities' open access institutional repositories. *Malaysian Journal of Library and Information Science*, 15: 543-573.
- Aminpour F 2006. *An Introduction to Scientometrics*. Isfahan: Isfahan University of Medical Sciences Publications.
- Bar-Ilan J 2009. Informetrics. *Encyclopedia of Library and Information Sciences*: 3<sup>rd</sup> Edition. London: Taylor & Francis.
- Garfield E 1999. Journal impact factor: A brief review. *Canadian Medical Association Journal*, 161: 979-980.
- Huda S, Tabassum A, Ahmed JU 2009. Use of ICT in the private universities of Bangladesh. *International Journal of Educational Administration*, 1: 77-82.
- Ingwersen P 1998. The calculation of web impact factors. *Journal of Documentation*, 54: 236-243.
- Islam Anwarul, Alam Saiful 2011. Webometric study of private universities in Bangladesh. *Malaysian Journal of Library and Information Science*, 16: 115-126.
- Jeysankar R, Ramesh Babu B 2009. Website universities of Tamil Nadu: A webometric study. *Annals of Library and Information Studies*, 56: 69-79.
- Larson RR 1996. Bibliometrics of the World Wide Web: An Explanatory Analysis of the Intellectual Structure of the Cyberspace. *Proceedings of the 59th Annual Meeting, ASIS96*, June 11-13 1996, Baltimore, MD, pp. 71-79.
- Mukhopadhyay P 2004. Measuring Web Impact Factors: A Webometric Study Based on the Analysis of Hyperlinks. *Proceedings of the National Seminar on Information Support for Rural Development*, December 4-5 2004, New Delhi, India.
- Ramesh Babu, Jeysankar B, Rao PN 2010. Websites of central universities in India: A webometric analysis. *DESIDOC Journal of Library and Information Technology*, 30: 33-43.
- Rodriguez I, Gairin JM 1997. Volorando el impacto de la informacion en Internet: AltaVista, el "Citation Index" de la Red (Impact assessment of information on the Internet: AltaVista, the citation index of the Web). *Revista Espanola de Documentacion Cientifica*, April-June, 20: 175-181.
- Smith AG 1999. A tale of two web spaces: Comparing sites using web impact factors. *Journal of Documentation*, 55: 577-592.
- Smith AG, Thelwall M 2002. Web impact factors for Australasian universities. *Scientometrics*, 54: 363-380.
- Statistical Cybermetrics Research Group. 2000. Search Engine Queries for Webometrics. From <<http://cybermetrics.wlv.ac.uk/QueriesForWebometrics.htm>> (Retrieved November 12, 2011).
- Tang R, Thelwall M 2003. Disciplinary differences in US academic departmental web site interlinking. *Library and Information Science Research*, 25: 437-458.
- Thelwall M 2000. Web impact factors and search engine coverage. *Journal of Documentation*, 56: 85.
- Thelwall M 2001. Extracting macroscopic information from web links. *JASIST*, 52: 1157-1168.
- Thelwall M 2002. A comparison of sources of links for academic Web Impact Factor calculations. *Journal of Documentation*, 58: 60-72.
- Thelwall M, Musgrove P, Wilkinson D 2003. The relationship between the links/Web Impact Factors of computer science departments in UK and their RAE (Research Assessment Exercise) ranking in 2001. *Scientometrics*, 57: 239-255.
- Vaughan L, Thelwall M 2003. Scholarly use of the web: What are the key inducers of links to journal web sites? *Journal of the American Society for Information Science and Technology*, 54: 29-38.
- Walia PK 2008. Webometric Analysis of Library Associations Websites of India. *IASLIC Bulletin*. 53: 131-143.