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## Webometric Analysis of Centres of Indian Statistical Institute in India

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# **Webometric analysis of centres of Indian Statistical Institute in India**

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## **Abstract**

Websites have become an essential media of communication for every institution as they efficiently disseminate the information to their users. This paper investigates the Web presence of ISI centres in India. The study analyses the number of webpages, various links such as Inlinks, Self-links and External links of websites by collecting information from the internet using various search engines (like Exalead, Google and Bing). Also, it analyses the Web Impact Factor and WISER rank for each website used in this study. It also presents the link-network diagram of ISI centres using SocSciBot 4 Software.

**Keywords:** Webometrics, Indian Statistical Institute, Web Impact Factor, WISER, Alexa, SocSciBot.

## **Introduction**

Websites have become one of the vital instrument for their stakeholders, so there is a necessity to assess their ranking. Institutions websites introduce to their users with various kind of information (such as about the institution, their related centres/research divisions, resources, services and members). It is beyond doubt that one of the essential factors for the success of an institute is its Website, Web accessibility and in particular its visibility on the Web.

Webometric is the quantitative analysis of web-related phenomena, content analysis, including links, search engine performances, and web technology analysis from an information science perspective (Björneborn and Ingwersen, 2001). According to Björneborn and Ingwersen, webometric 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”. It covers research of all network-based communication using informetric or other quantitative measures. Webometric has become one of the most exciting research areas for the vast collection of electronic information available on the publicly indexable Web.

## **Concept of Webometric**

The base of Webometric can be established in the Information Science field. The term Webometrics was coined in 1997 by Tomas Almind and Peter Ingwersen in recognition that informetric analyses could be applied to the web.

The Online Dictionary for Library and Information Science (ODLIS) defines webometrics as “description and evaluation of the impact of the Internet as a scholarly communication tool, primarily by means of quantitative analysis of web-based scholarly and scientific communications”.

Webometrics is “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” (Thelwall, 2009).

According to Björneborn and Ingwersen (2004), Webometrics study covers the construction side and usage side of the web which embrace the four main areas such as:

- Web page content analysis;
- Web link structure analysis (e.g. Hyperlink, Self-link, External link and Inlink);
- Web usage analysis (e.g. exploiting log files for users searching and browsing behaviour); and
- Web technology analysis (including search engine performance).

The idea of measuring average link frequencies, that is, the Web Impact Factor (WIF), as one of the quantitative indicators or the average link frequencies has been developed by Ingwersen. (1998). WIFs are part of the methodology of Webometrics. Broadly, it is a measure of the extent to which it is linked to and recognised by other sites.

## **About Indian Statistical Institute**

The Indian Statistical Institute (ISI) is a unique institution devoted to research and teaching, and the applications of Statistics in the Natural and Social Sciences. ISI grew out of the Statistical Laboratory set up by Prasanta Chandra Mahalanobis in Presidency College, Kolkata. It was registered on 28th April 1932 as a non-profit distributing learned society under the West Bengal Societies Registration Act, 1860. The outstanding contributions made by the Institute in theoretical and applied statistical work culminated in recognition of the Institute as an “Institute of National Importance” by an Act of the Parliament in 1959.

The Headquarters of ISI is located at Kolkata and has four subsidiary centres in the major cities of India, i.e., Delhi, Bangalore, Chennai and Tezpur. ISI functions under the Ministry of

Statistics and Programme Implementation (MOSPI) of the Government of India and offers several under-graduate, post-graduate and doctoral degree programmes which are internationally acclaimed.

## **Review of Literature**

Jeyshankar (2019) did a webometric analysis of the website of deemed universities in India. The study covered 125 deemed universities in India. The researcher identified and classified the four domains like State Universities, Central Universities, Deemed Universities and Private Universities. The study calculated the Internal Link, External Link, backlink and Size of the website.

Jeyshankar and Nachiappan (2018) conducted a webometric analysis of Council of Scientific and Industrial Research (CSIR - India) Institutes Website. The study aimed to establish a kind of ranking of websites of CSIR institutions in India by measuring their Web Impact Factor (WIF) and rank them as per the WIF and analysed the link network of the CSIR websites in India.

Baka and Leyni (2017) worked on a webometric study of world-class universities websites. The objective of the study was to determine whether there are differences in terms of visibility and accessibility of the top thirty and the bottom thirty world-class universities websites. In the study Alexa software was applied to study the visibility of universities websites.

Jeyshankar, Maria and Valarmathi (2012) conducted webometric analysis on web pages of ICMR institutes websites. Their study concentrated on the classification of websites by webpage size, WAVE (Web AIM Accessibility Error), various search engine performances, the difference between pages in various time intervals and number of rich files were also calculated. It also presented the Link – network diagram of ICMR institutes using Pajek Software.

Ramesh Babu, Jeyshankar and Rao (2010) did a webometric analysis on websites of central universities in India. This study investigates domain systems of the websites, analyses the number of webpages and link pages and calculates the simple web impact factor, self-link web impact factor, external link web impact factor and revised web impact factor.

The review contains studies on the areas of Webometrics. After going through all the reviews, it is found that a number of studies were carried out on certain parameters of websites analysis such as link structure analysis which includes the analysis of Self Links, Hyperlink, External links and Inlinks. Also, there are studies on Web Impact Factor, search engine performances, webpage content analysis and web usage analysis.

Overall review of literature shows that probably there is no comprehensive study reported on websites of Indian Statistical Institute (ISI) in general and its centres in particular. Therefore, it is visualised to conduct a webometric analysis of centres of ISI in India.

## Objectives

1. To trace and classify the domain of websites.
2. To calculate the Simple Web Impact Factor, Self-Link Web Impact Factor, External Link Web Impact Factor, and Revised Link Web Impact Factor of websites of ISI centres.
3. To calculate the WISER ranking of websites.
4. To evaluate the websites of ISI centres according to Google Page Rank.
5. To assess and analyse the Traffic Rank, Sites linking in of websites through Alexa.
6. To generate a link topology among all the ISI centres in India.

## Scope

The present study focuses on Webometric analysis of centres of the Indian Statistical Institute. In this study, various webometric tools and techniques were used to analyse the websites of ISI centres. This study included five ISI centres, comprising of the Headquarters of the Indian Statistical Institute under its purview. Offices of the Institute, located in several other cities in India and are excluded from the study.

**Table 1: Centres of Indian Statistical Institute in India and their URLs**

S. No.	Name of Institute	State/UT	URL
1.	Indian Statistical Institute, Bangalore	Karnataka	<a href="https://www.isibang.ac.in">https://www.isibang.ac.in</a>
2.	Indian Statistical Institute, Chennai	Tamil Nadu	<a href="https://www.isichennai.res.in">https://www.isichennai.res.in</a>
3.	Indian Statistical Institute, Delhi	Delhi	<a href="https://www.isid.ac.in">https://www.isid.ac.in</a>
4.	Indian Statistical Institute, Kolkata	West Bengal	<a href="https://www.isical.ac.in">https://www.isical.ac.in</a>
5.	Indian Statistical Institute, Tezpur	Assam	<a href="http://www.isine.ac.in">http://www.isine.ac.in</a>

## Research Methodology

This study is web-based research on the analysis of websites of ISI centres in India. Data for the study was collected in the month of January 2020 using commercial search engines such as Google, Bing, etc. as well as personal web crawlers like SocSciBot 4. The study has used the following webometric tools and techniques for analysis of the data:

- **Link Analysis:** The following search keywords (Ingwersen, 1998) were used to collect data related to the links of each websites using 'Exalead' search engine:
  - *domain:isibang.ac.in* for total web pages;
  - *linkdomain:isibang.ac.in* for link webpages;
  - *linkdomain:isibang.ac.in NOT domain:isibang.ac.in* for inlink webpages;

- *linkdomain:isibang.ac.in AND domain:isibang.ac.in* for self-link webpages;
- *linkdomain:isibang.ac.in AND NOT domain:isibang.ac.in* for external link webpages.

➤ **Web Impact Factor (WIF):** Web Impact Factor is the web version of the impact factor. It was introduced by Ingwersen (1998) which is calculated by taking the following formula, i.e., the ratio of the number of backlinks to a site, divided by the number of webpages at the site.

In this study, four types of Web Impact Factor were formulated in the following way:

- $Simple\ WIF = \frac{Link\ Web\ Pages\ (B)}{Number\ of\ web\ pages\ indexed\ by\ the\ search\ engine\ (A)}$
- $Self\ Link\ WIF = \frac{Number\ Self\ Link\ Pages\ (C)}{Number\ of\ web\ pages\ indexed\ by\ the\ search\ engine\ (A)}$
- $External\ link\ WIF = \frac{Number\ of\ External\ link\ pages\ (D)}{Number\ of\ web\ pages\ indexed\ by\ the\ search\ engine\ (A)}$
- $Revised\ WIF = \frac{Number\ of\ Inlink\ Pages\ (E)}{Numbers\ of\ web\ pages\ indexed\ by\ the\ search\ engine\ (A)}$

➤ **Web Indicators for Scientific, Technological and Innovation Research (WISER) Rank:** The methods explained by Shukla and Poluru (2012) were used to investigate the WISER rank of ISI centres in India. It was calculated by using the following formula:

$$\boxed{WISER\ Rank\ (WR) = 4*Rank\ (V)+2*Rank\ (S)+1*Rank\ (R)+1* Rank\ (Sc)}$$

The WISER consists of various parameters such as:

- **Visibility (V):** Keyword- *linkdomain:isibang.ac.in NOT domain:isibang.ac.in* is used for collecting visibility of websites through *Exalead* search engine.
- **Size (S):** The search engines namely *Google, Bing and Exalead* were used for collecting data regarding the size for each website.
- **Rich Files (R):** The rich files namely, Adobe Acrobat (.pdf), Microsoft Excel (.xls), Microsoft Word (.doc) and Microsoft Powerpoint (.ppt) were extracted by keyword- *site:isibang.ac.in filetype:pdf/xls/doc/ppt* using *Google* search engine.
- **Scholar (Sc):** The scholarly publications of each ISI centre were retrieved from Google Scholar.

➤ **Google Page Rank:** Page Rank is a link analysis algorithm used by Google search engine that assigns a numerical weighting to each element of a hyperlinked set of documents in the World Wide Web, with the purpose of "measuring" its relative importance within the set

(Smith & Thelwall, 2002). The Page Rank of a particular page is roughly based upon the quantity of inbound links as well as the Page Rank of the pages providing the links.

- **Alexa:** Alexa global traffic rank is a measure of how a website is doing relative to all other sites on the web over the past three months. The rank is calculated using a proprietary methodology that combines a site's estimated average of daily unique visitors and its estimated number of page views over the past three months (<https://www.alexa.com/about>).

Alexa Web Information Company was used to retrieve the following elements for each website.

- Traffic Rank
- Sites Linking In

- **Alternative Document Model (ADM):** There is a need for collecting data not only through commercial search engines but also academic web crawlers to overcome any biases. The advantage of academic crawler is that it is possible to cover individual website comprehensively within specified parameters. Thelwall (2000) suggested Alternative Document Model (ADM) to collect the link data.

## Data Analysis and Interpretation

Detailed analysis of data with interpretations have been presented in this section. The data collected from various web resources are quantitatively analysed to fulfil the objectives. Data are systematically classified, tabulated, analysed and interpreted in the following manner.

**Table 2: Domain-wise distribution of Websites**

S. No.	Domain	No.	Percentage
1.	.ac.in	4	80
2.	.res.in	1	20
3.	Others	-	-
Total		5	100.00

Table 2 shows the domain-wise distribution of websites of ISI centres in India. It can be seen from the table, that *.ac.in* has been widely used in the websites of ISI centres. 4(80%) centres have *.ac.in* in their URLs and only 1(20%) centre have *.res.in* in its URL. This phenomenon explains that there is no homogeneity among the websites of ISI centres.

**Table 3: Status of Web Pages of ISI centres in India**

S. No.	Name of Centre	NWP (A)	LWP (B)	SLWP (C)	ELWP (D)	ILWP (E)
1.	ISI Bangalore	767	729	780	1	1
2.	ISI Chennai	56	53	57	0	0
3.	ISI Delhi	12506	12995	12424	1268	1224
4.	ISI Kolkata	2790	2901	2835	0	0
5.	ISI Tezpur	9869	10763	11035	2477	2468

*Note: NWP= No. of Web Pages, LWP= Link Web Pages, SLWP= Self-Link Web Pages, ELWP= External Link Web Pages, ILWP= In Link Web Pages.*

(As on January 30, 2020)

The search engine 'Exalead' has been used to collect the data regarding web pages of each website in this study. Table 3 explains about the number of Web Pages, number of Link Web Pages, number of Selflink Web Pages, number of External Link Web Pages and the number of In Link Web Pages of Indian Statistical Institute centres in India.

**Table 4: Simple Web Impact Factor**

S. No.	Name of Centre	NWP (A)	LWP (B)	SWIF (B/A)	Ranked by SWIF
1.	ISI Tezpur	9869	10763	1.0906	1
2.	ISI Kolkata	2790	2901	1.0398	2
3.	ISI Delhi	12506	12995	1.0391	3
4.	ISI Bangalore	767	729	0.9505	4
5.	ISI Chennai	56	53	0.9464	5

*Note: NWP= No. of Web Pages, LWP= Link Web Pages, SWIF= Simple Web Impact Factor*

Table 4 arranges the rank of the ISI centres in India according to their Simple Web Impact Factor (SWIF). Indian Statistical Institute, Tezpur occupies the first place with 1.0906 SWIF, followed by Indian Statistical Institute, Kolkata and Indian Statistical Institute, Delhi with 1.0398 and 1.0391 SWIF respectively. Indian Statistical Institute, Bangalore (0.9505) and Indian Statistical Institute, Chennai (0.9464) have occupied fourth and fifth position respectively in the ranking as their number of link pages and number of web pages are very less as compared to other ISI centres.



**Table 5: Self-Link Web Impact Factor**

S. No.	Name of Centre	NWP (A)	SLWP (C)	SLWIF (C/A)	Ranked by SLWIF
1.	ISI Tezpur	9869	11035	1.1181	1
2.	ISI Chennai	56	57	1.0179	2
3.	ISI Bangalore	767	780	1.0169	3
4.	ISI Kolkata	2790	2835	1.0161	4
5.	ISI Delhi	12506	12424	0.9934	5

*Note: NWP= No. of Web Pages, SLWP= Self Link Web Pages, SLWIF= Self-Link Web Impact Factor*

The self-link web impact factor for rank of the ISI centres in India is shown in Table 5. Analysis of the resultant data shows that Indian Statistical Institute, Tezpur occupies first place with 1.1181 SLWIF followed by Indian Statistical Institute, Chennai and Indian Statistical Institute, Bangalore at the second and third position with SLWIF of 1.0179 and 1.0169 respectively. Similarly, Indian Statistical Institute, Kolkata (1.0161) and Indian Statistical Institute, Delhi (0.9934) stood at fourth and fifth positions respectively.

**Table 6: External Link Web impact Factor**

S. No.	Name of Centre	NWP (A)	ELWP (D)	ELWIF (D/A)	Ranked by ELWIF
1.	ISI Tezpur	9869	2477	0.2510	1
2.	ISI Delhi	12506	1268	0.1014	2
3.	ISI Bangalore	767	1	0.0013	3
4.	ISI Chennai	56	0	0.0000	-
5.	ISI Kolkata	2790	0	0.0000	-

*Note: NWP= No. of Web Pages, ELWP= External Link Web Pages, ELWIF= External Link Web Impact Factor*

Table 6 shows the rank distribution for all the ISI centres in India according to their External Link Web Impact Factor (ELWIF). It is clearly visible from Table 6 that Indian Statistical Institute, Tezpur having 2477 ELWP and 9869 NWP with 0.2510 ELWIF occupies the first position among all the 5 ISI centres; followed by Indian Statistical Institute, Delhi with 0.1014 ELWIF. Indian Statistical Institute, Bangalore stood at the 3th position with 0.0013 ELWIF. It is to be noted that for Indian Statistical Institute, Chennai and Indian Statistical Institute, Kolkata no external link web pages were found using 'Exalead' search engine.

**Table 7: Revised Link Web Impact Factor**

<b>S. No.</b>	<b>Name of Centre</b>	<b>NWP (A)</b>	<b>ILWP (E)</b>	<b>RLWIF (E/A)</b>	<b>Ranked by RLWIF</b>
1.	ISI Tezpur	9869	2468	0.2501	1
2.	ISI Delhi	12506	1224	0.0979	2
3.	ISI Bangalore	767	1	0.0013	3
4.	ISI Chennai	56	0	0.0000	-
5.	ISI Kolkata	2790	0	0.0000	-

*Note: NWP= No. of Web Pages, ILWP= Internal Link Web Pages, RLWIF= Revised Link Web Impact Factor*

Table 7 exhibits the rank distribution of all the ISI centres according to their Revised Link Web Impact Factor (RLWIF). Indian Statistical Institute, Tezpur is ranked first with 0.2501 RLWIF; followed by Indian Statistical Institute, Delhi with 0.0979 RLWIF. Indian Statistical Institute, Bangalore occupied 3rd position with 0.0013 RLWIF.

**Table 8: Visibility of Websites (V)**

<b>S. No.</b>	<b>Name of Centre</b>	<b>Inlinks</b>	<b>Standardized Value (V)</b>	<b>Standardized Value (V)*4</b>	<b>Rank</b>
1.	ISI Tezpur	2468	1.0000	4.0000	1
2.	ISI Delhi	1224	0.4959	1.9836	2
3.	ISI Bangalore	1	0.0004	0.0016	3
4.	ISI Chennai	0	0.0000	0.0000	-
5.	ISI Kolkata	0	0.0000	0.0000	-

Data for the WISER ranking analysis of all the ISI centres in India have been provided in the tables from 8 to 12.

The total number of unique inlinks received by a site can be used to calculate visibility of the website. Table 8 depicts the calculation of Visibility for Websites of ISI centres. From the table 8 it is seen that Indian Statistical Institute, Tezpur has the highest number of inlinks (2468) among all the ISI centres in India so it is ranked first in Visibility. Indian Statistical Institute, Delhi is ranked second with 1224 inlinks. Indian Statistical Institute, Bangalore stood at the third position.

**Table 9: Size for Websites (S)**

S. No.	Name of Centre	Google	Bing	Exalead	Size	Standardized value (S)	2* Standardized value (S)	Rank
1.	ISI Kolkata	160000	16800	1299	178099	1.0000	2.0000	1
2.	ISI Bangalore	20300	3440	163	23903	0.1342	0.2684	2
3.	ISI Delhi	9080	5580	283	14943	0.0839	0.1678	3
4.	ISI Tezpur	277	1560	11	1848	0.0104	0.0208	4
5.	ISI Chennai	374	1270	20	1664	0.0093	0.0187	5

Size of each ISI centre's website is calculated by adding the result of number of web pages from three search engines i.e., Google, Bing and Exalead. Table 9 depicts the calculation of size for websites of ISI centres in India. It is obvious from the table that Indian Statistical Institute, Kolkata with the size of 178099 is ranked first among all the centres. Indian Statistical Institute, Bangalore with the size of 23903 and Indian Statistical Institute, Delhi with the size of 14943 are ranked with 2<sup>nd</sup> and 3<sup>rd</sup> position respectively based on their size value. Indian Statistical Institute, Chennai is ranked last in the list.

**Table 10: Rich Files for Websites (R)**

S. No.	Name of Centre	.pdf	.doc	.ppt	.xls	Total Rich Files	Standardized Value (R)	Rank
1.	ISI Kolkata	11900	1	1	1	11903	1.0000	1
2.	ISI Bangalore	6550	1	1	1	6553	0.5505	2
3.	ISI Delhi	6040	1	1	1	6043	0.5077	3
4.	ISI Chennai	217	0	0	0	217	0.0182	4
5.	ISI Tezpur	212	0	0	0	212	0.0178	5

Table 10 shows the calculation of rich files for websites of ISI centres in India. It is shown in the table that Indian Statistical Institute, Kolkata with 11903 rich files, Indian Statistical Institute, Bangalore with 6553 rich files and Indian Statistical Institute, Delhi with 6043 rich files occupy the top 3 positions respectively. Indian Statistical Institute, Tezpur with only 212 rich files is ranked last in the list.

**Table 11: Research Output on Google Scholar (Sc)**

S. No.	Name of Centre	Google Scholar (Sc)	Standardized Value	Rank
1.	ISI Kolkata	10900	1.0000	1
2.	ISI Delhi	1900	0.1743	2
3.	ISI Bangalore	1790	0.1642	3
4.	ISI Chennai	285	0.0261	4
5.	ISI Tezpur	10	0.0009	5

Table 11 presents the calculation of research output on Google Scholar for websites of ISI centres in India. It is clear from the table that Indian Statistical Institute, Kolkata is ranked first with 10900 output, Indian Statistical Institute, Delhi is ranked second with 1900 output, Indian Statistical Institute, Bangalore is ranked third with 1790 output, Indian Statistical Institute, Chennai is ranked fourth with 285 output and Indian Statistical Institute, Tezpur having minimum number of scholarly publications i.e., only 10 is at the last position among all the centres.

**Table 12: WISER Ranking of Websites**

S. No.	Name of Centre	4* Rank V	2* Rank S	1* Rank R	1* Rank Sc	WISER	Rank
1.	ISI Tezpur	4.0000	0.0208	0.0178	0.0009	4.0395	1
2.	ISI Kolkata	0.0000	2.0000	1.0000	1.0000	4.0000	2
3.	ISI Delhi	1.9836	0.1678	0.5077	0.1743	2.8334	3
4.	ISI Bangalore	0.0016	0.2684	0.5505	0.1642	0.9848	4
5.	ISI Chennai	0.0000	0.0187	0.0182	0.0261	0.0631	5

Table 12 depicts the WISER ranking of websites of ISI centres in India. According to WISER ranking, Indian Statistical Institute, Tezpur is ranked first with 4.0395 WISER value followed by Indian Statistical Institute, Kolkata which is ranked second with 4.0000 WISER value. Indian Statistical Institute, Delhi is ranked third with 2.8334 WISER value. Indian Statistical Institute, Bangalore and Indian Statistical Institute, Chennai occupy the last two ranks with 0.9848 and 0.0631 WISER value respectively.

**Table 13: Google Page Rank of Websites**

S. No.	Name of Centre	Google Page Rank (Out of 10)	Rank
1.	ISI Delhi	5	1
2.	ISI Kolkata	5	1
3.	ISI Bangalore	4	2
4.	ISI Chennai	3	3
5.	ISI Tezpur	2	4

Table 13 presents the Google Page Rank of websites of ISI centres in India. It is observed from the table that Indian Statistical Institute, Delhi and Indian Statistical Institute, Kolkata are collectively ranked first with Google Page Rank of 5 each. Indian Statistical Institute, Bangalore is ranked second with Google Page Rank of 4. Indian Statistical Institute, Chennai and Indian Statistical Institute, Tezpur with Google Page Rank of 3 and Google Page Rank of 2 occupy the 3<sup>rd</sup> and 4<sup>th</sup> positions respectively.

**Table 14: Inlinks retrieved from Alexa**

S. No.	Name of Centre	Total Sites Linking In	Rank
1.	ISI Kolkata	1227	1
2.	ISI Delhi	406	2
3.	ISI Bangalore	387	3
4.	ISI Chennai	82	4
5.	ISI Tezpur	27	5

The data on Inlinks retrieved from Alexa for the websites of ISI centres in India have been shown in the Table 14. From the table, it can be seen that Indian Statistical Institute, Kolkata with 1227 inlinks is ranked first; Indian Statistical Institute, Delhi with 406 inlinks is ranked second; Indian Statistical Institute, Bangalore with 387 inlinks is ranked third and Indian Statistical Institute, Chennai with 82 inlinks is ranked fourth. Indian Statistical Institute, Tezpur with only 27 inlinks is ranked last as it has the least number of inlinks.

**Table 15: Alexa Traffic Rank**

S. No.	Name of Centre	Traffic Rank	Rank
1.	ISI Kolkata	88008	1
2.	ISI Delhi	400026	2
3.	ISI Bangalore	406450	3
4.	ISI Chennai	1833266	4
5.	ISI Tezpur	7952206	5

Table 15 illustrates the Alexa Global Traffic Rank of websites of ISI centres in India. According to the data in the table, Indian Statistical Institute, Kolkata having rank 88008 is ranked 1<sup>st</sup> followed by Indian Statistical Institute, Delhi which is ranked 2<sup>nd</sup> with 400026 rank. Indian Statistical Institute, Bangalore is ranked 3<sup>rd</sup> with 406450 rank. Indian Statistical Institute, Chennai and Indian Statistical Institute, Tezpur are at 4<sup>th</sup> and 5<sup>th</sup> position respectively.

**Table 16: Combined Ranking of Websites**

S. No.	Name of Centre	Web Pages	WISER value	Inlinks by Alexa	Page Rank	Scores	Rank
1.	ISI Delhi	12506	2.8334	406	5	12919.83	1
2.	ISI Tezpur	9869	4.0395	27	2	9902.04	2
3.	ISI Kolkata	2790	4.0000	1227	5	4026.00	3
4.	ISI Bangalore	767	0.9848	387	4	1158.98	4
5.	ISI Chennai	56	0.0631	82	3	141.06	5

It was interesting to examine whether the rank of each parameter in this webometric analysis applies to more or less same rank to the institutes as a whole. So the following four standards were selected to rank the ISI centres in India.

1. Webpages: Number of Pages of a website.
2. WISER value: Based on formula,  $WISER = 4 * Rank V + 2 * Rank S + 1 * Rank R + 1 * Rank Sc$ .
3. Inlinks by Alexa: Inlinks of the site retrieved by Alexa web information company.
4. Google Page Rank: The rank assigned by Google for each website.

Table 16 exhibits the combined ranking of websites of ISI centres in India based on four selected standards used in the study. It is understood from the table that Indian Statistical Institute, Delhi and Indian Statistical Institute, Tezpur with 12919.83 and 9902.04 score values are ranked first and second respectively, whereas Indian Statistical Institute, Kolkata is ranked third with the score value 4026.00. Fourth and fifth ranks are occupied by Indian Statistical

Institute, Bangalore and Indian Statistical Institute, Chennai with the score values 1158.98 and 141.06 respectively.

**Table 17: ADM counts summary for ISI centres in India**

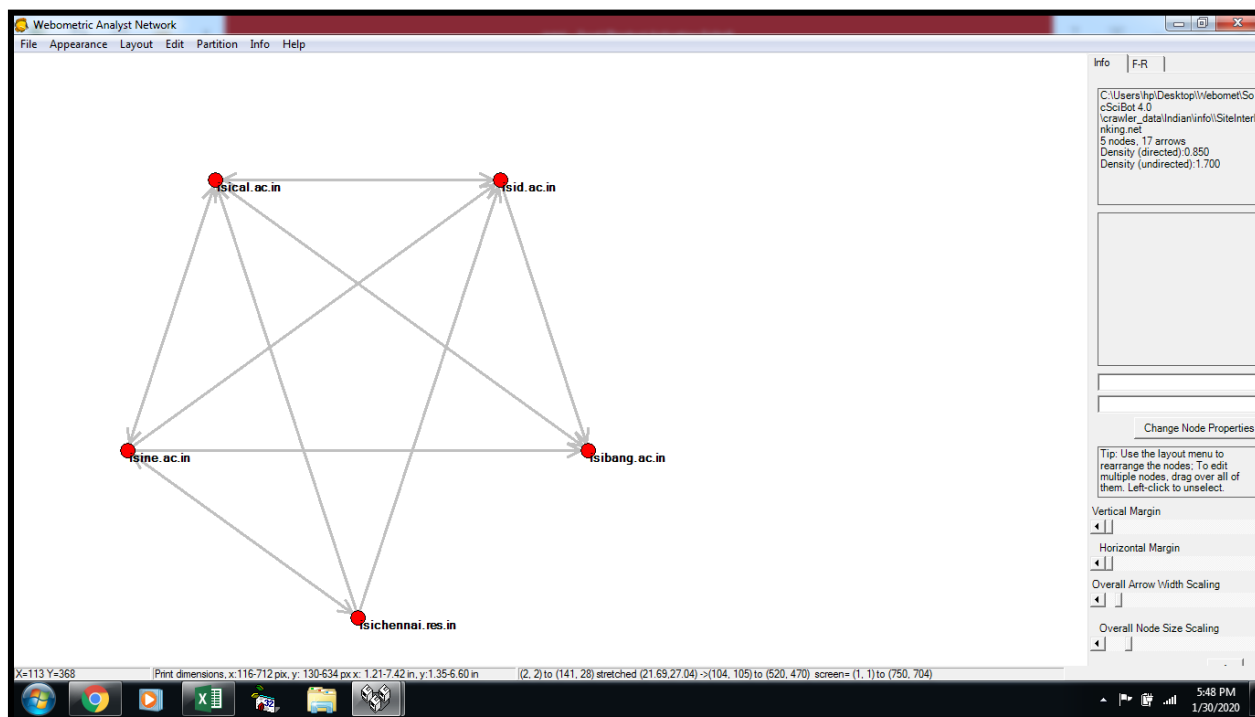
Name	Page inlinks	Directory inlinks	Domain inlinks	Site inlinks	Page outlinks	Directory outlinks	Domain outlinks	Site outlinks
isibang.ac.in	3	3	3	3	0	0	0	0
isichennai.res.in	1	1	1	1	4	3	3	3
isid.ac.in	5	5	3	3	7	4	2	2
isical.ac.in	40	23	4	3	3	3	3	3
isine.ac.in	2	2	2	2	37	24	5	4

*Source: SocSciBot 4 dated January 30, 2020*

Personal web crawler, i.e., SocSciBot 4 has been used to extract the ADM count summary as explained in table 17 and the link data for the purpose of constructing link topology among the ISI centres in India as shown in figure 1.

From the table 17 it can be seen that Indian Statistical Institute, Kolkata having maximum page inlinks (40) and Indian Statistical Institute, Tezpur having the maximum number of page outlinks (37) are well connected with all the other ISI centres in India.

**Figure 1: Link Topology of ISI centres in India**



*(Source: SocSciBot 4 dated January 30, 2020)*

It can be seen from Figure 1 that websites of ISI centres in India are well connected with each other as a beautiful star-shaped link topology has been formed among them. There is a significant web-based association amongst these centres.

## Findings

- ❖ It is revealed from the analysis of URL that two types of “domain extensions” were observed in this study. 4(80%) centres have “.ac.in” extension, followed by “.res.in” 1(20%). This phenomenon explains that there is no homogeneity among all the websites of ISI centres.
- ❖ Among all the ISI centres in India, Indian Statistical Institute, Tezpur is in the first place with 1.0906 Simple Web Impact Factor (SWIF), followed by Indian Statistical Institute, Kolkata and Indian Statistical Institute, Delhi occupies second and third ranks having 1.0398 and 1.0391 SWIF respectively.
- ❖ Indian Statistical Institute, Tezpur is in the first position with 1.1181 Self-Link Web Impact Factor (SLWIF) followed by Indian Statistical Institute, Chennai and Indian Statistical Institute, Bangalore at the second and third position with SLWIF of 1.0179 and 1.0169 respectively.
- ❖ According to the rank assigned on the basis of External Link Web Impact Factor (ELWIF), Indian Statistical Institute, Tezpur with 0.2510 ELWIF occupies the first position among all the ISI centres; followed by Indian Statistical Institute, Delhi with 0.1014 ELWIF at the second position. Indian Statistical Institute, Bangalore with 0.0013 ELWIF is at the third position.
- ❖ Indian Statistical Institute, Tezpur is ranked first with 0.2501 Revised Link Web Impact Factor (RLWIF); followed by Indian Statistical Institute, Delhi with 0.0979 RLWIF. Indian Statistical Institute, Bangalore occupied the third position with 0.0013 RLWIF.
- ❖ According to WISER ranking, Indian Statistical Institute, Tezpur is ranked first with 4.0395 WISER value followed by Indian Statistical Institute, Kolkata which is ranked second with 4.0000 WISER value. Indian Statistical Institute, Delhi is ranked third with 2.8334 WISER value.
- ❖ According to Google Page Rank of websites of ISI centres in India; Indian Statistical Institute, Delhi and Indian Statistical Institute, Kolkata are collectively ranked first with Google Page Rank of 5 each. Indian Statistical Institute, Bangalore is ranked second with Google Page Rank of 4. Indian Statistical Institute, Chennai with Google Page Rank of 3 occupies the third position.
- ❖ Analysis of Inlinks retrieved from Alexa of the websites shows that Indian Statistical Institute, Kolkata with 1227 inlinks is ranked first followed by Indian Statistical Institute,



Delhi with 406 inlinks is ranked second and Indian Statistical Institute, Bangalore with 387 inlinks is ranked third. Allahabad State University with 125 inlinks is ranked last as it has the least number of inlinks.

- ❖ According to the Alexa Global Traffic Rank of websites of ISI centres in India, Indian Statistical Institute, Kolkata having traffic rank 88008 was ranked first followed by Indian Statistical Institute, Delhi which is ranked second with 400026 traffic rank. Indian Statistical Institute, Bangalore is ranked third with 406450 traffic rank.
- ❖ The combined ranking of websites of ISI centres was calculated on the basis of four selected standards used in the study. Indian Statistical Institute, Delhi and Indian Statistical Institute, Tezpur with 12919.83 and 9902.04 score values were ranked first and second respectively, whereas Indian Statistical Institute, Kolkata was ranked third with the score value 4026.00. Fourth and fifth ranks were occupied by Indian Statistical Institute, Bangalore and Indian Statistical Institute, Chennai with the score values 1158.98 and 141.06 respectively.
- ❖ From the study, it can be seen that using commercial search engines (such as Google, Bing) Indian Statistical Institute, Delhi was ranked first. However, with the use of academic web crawler (i.e., SocSciBot 4) Indian Statistical Institute, Kolkata occupied the top rank among all the ISI centres in India.
- ❖ According to the link topology it was observed that the websites of ISI centres in India are well connected with each other. There is a significant web-based association amongst these centres.

## **Conclusion**

Institutes' websites can be used as a communicative bridge between institutions' achievements and services to their audiences. Considering the importance of websites as one of the popular media, and also to make them useful and accessible for all, the designers of the website should pay much attention to them and attempt to subside the problems and disadvantages in order to gain more user satisfaction. One way to do this is to introduce one website with other sites on the Web in order to gain more links. Connectivity plays a vital role in recognizing websites in extended virtual environments. Another way to enhance websites ranking is to provide services that attract international visitors.

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