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Council of Scientific and Industrial Research (CSIR - India) Institutes Website: A Webometric Analysis

Jeyshankar -. Ramalingam -

Dept. of Library and Information Science, Alagappa UNiversity, Tamil Nadu, India, jeyshankar71@gmail.com

Nachiappan N

Ramasamy Tamil College, Alagappa University, Karaikudi – 630 003, nachiappanlis@gmail.com

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**COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH (CSIR - INDIA)
INSTITUTES WEBSITE: A WEBOMETRIC ANALYSIS**

Dr. R. Jeyshankar

Assistant Professor, Department of Library and Information Science
Alagappa University, Karaikudi – 630 003,
Email: jeyshankar71@gmail.com

&

Dr. N. Nachiappan

Librarian
Ramasamy Tamil College, Karaikudi – 630 003
Email: nachiappanlis@gmail.com

Abstract

The term 'webometrics' was coined for the quantitative analysis of web – related phenomena, content analysis, including links, search engine performances and web technology analysis from an information science perspective. This paper explored into the webometric study of web sites of Council of Scientific and Industrial Research (CSIR) institutions in India. There are 41 CSIR research institutions in India. The study aimed at to establish a kind of ranking of websites of CSIR institutions in India by measuring their WIF. The study of the ranking will help the reader to compare and identify CSIR institutions websites in India by their WIF. The objectives of the study includes, To identify and classify the domain of CSIR institutes' websites in India; To calculate the Number of WebPages, Number of link pages, Number of self link pages and external link pages of CSIR institutes' websites in India; To calculate the Simple Web Impact Factor (WIF), Self link Web Impact Factor, External Web Impact factor and Revised Web Impact Factor of CSIR institutes'' websites in India and rank them as per the WIF and To analyse the link network of the CSIR websites in India. Four types of links and Web Impact Factors are formulated as The Simple WIF, the ratio of all links to the number of pages; The Self Link WIF, the ratio of self links within the site to number of pages; The external WIF, the ratio of links made from external sites to the target site, to the number of pages at the site ;The Revised WIF, and the ratio of links made incoming from other sites.

Keywords: Webometrics, Web Impact Factor, Self Link Pages, External Link Pages and CSIR.

1 Introduction

Web links are the fascinating object of study because of the implicit information that they contain: the premise that a page with many inlinks is likely to be useful to drives the search engine for retrieve the information. Ingwersen (1998) introduced the key link count metric, the Web Impact Factor, which has since been used in various guises to drive research into this phenomenon. The research institutions websites have been the most intensively studied and it is now known that aggregates of links to an institutions correlate with measures of its research output, once size is taken into account. Link analysis is performed in very diverse subjects, like computer science, information science and communication studies etc. This is importance of the web and to a widespread belief that hyperlinks between web pages can yield useful information. The different subjects have contributed all valuable insights into links and have exploited them for different purposes.

The information science, the potential for link analysis was recognised when the commercial search engine Altavista released an interface that allowed users to conduct various types of searches for pages containing self links, external links and inlinks. The term ‘webometrics’ was subsequently coined for the quantitative analysis of web – related phenomena, content analysis, including links, search engine performances and web technology analysis from an information science perspective.

2 CSIR: A Brief Note

The Council of Scientific and Industrial Research (CSIR, 2010) is the name of the nationwide research platform consisting of a network of laboratories which spans the geographical dimensions of India. Its programmes which bridge various disciplines, address specific needs which arose in the process of social transformation in the post-colonial context and demands which our society faces in this period of globalization.

The CSIR was established in 1942 as a autonomous, non-profit organization with a wide ranging charter of functions. This multidisciplinary and multilocational council runs 41 laboratories and 80 field centres which carry out fundamental and applied research development such as Biological Sciences, Chemical Sciences, Engineering Sciences, Information Sciences and Physical Sciences. The functions

assigned to CSIR were promotion, guidance and co-ordination of scientific and industrial research, collection and dissemination of information on research and industry, founding of laboratories to carry forward scientific and industrial research and utilization of the new knowledge so generated for development of industry. CSIR was also charged with other tasks such as rendering assistance to other institutions conducting research, awarding of fellowships and publishing of scientific journals.

CSIR publishes 15 primary scholarly science journals 10 bulletins on specific science area such as electro-chemistry, fuel science and technology, mining research, mechanical engineering, medicinal, aromatic plant sciences, Intellectual property rights and so on.

CSIR fosters symbiotic science and technology cooperation with its counterparts abroad through bilateral and multilateral co-operation and exchange programmes. It has science and technology collaborative agreements/arrangements with 30 agencies in 27 countries. CSIR has been continually striving to achieve these objectives leading to generation of new knowledge and new products, processes and technologies in diverse areas ranging from chemicals and drugs to materials and electronics; from safe drinking water and food technology to aerospace; from pro-environment protection and toxicology to petroleum processing. In the process, CSIR has grown to span a very wide science and technology base. It now has laboratories spread all over India.

Table 1
Distribution of CSIR Research Institutes of India by State wise

Sl. No.	Name of States & Unions	No. of CSIR Research Organisation (n = 41)	%
1	Delhi	5	12.20
2	Tamil Nadu	4	9.76
3	Uttar Pradesh	4	9.76
4	Andhra Pradesh	3	7.32
5	Jharkhand	3	7.32
6	Karnataka	3	7.32
7	Maharashtra	3	7.32
8	West Bengal	3	7.32
9	Punjab	2	4.88
10	Uttaranchal	2	4.88
11	Assam	1	2.44

12	Goa	1	2.44
13	Gujarat	1	2.44
14	Himachal Pradesh	1	2.44
15	J & K	1	2.44
16	Kerala	1	2.44
17	Madhya Pradesh	1	2.44
18	Orissa	1	2.44
19	Rajasthan	1	2.44
Total		41	100.00

The distribution of CSIR Research Institutes in India is given in the Table 1. Almost 19 Indian states have established CSIR research institutes. Delhi have the maximum of 5(12.20 %) CSIR research institutes, Tamil Nadu and Uttar Pradesh have 4 (9.762%) CSIR research institutes followed by Andhra Pradesh, Jharkhand, Karnataka, Maharashtra and West Bengal with three CSIR research institutes.

4 Concepts of Webometrics

Quantitative Studies of the web have been named as webometrics by Almind and Ingwersen, although the basic issue had been identified simultaneously by Larson (1996) who is also a pioneer with his early exploratory link structure analysis with the first pure Informetrics analysis of the Web.

Bojorneborne & Ingwersen (2004) defined webometrics as: “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”. This definition covers the construction side and usage side of the websites.

Thelwall (2002) has states that the earlier Web link studies have used the Web page as the primary indivisible source document for counting purposes. Three alternative heuristics are defined for the educational arena based upon the directory, the domain and the whole university site. These are then compared by implementing them on a set of 108 UK university institutional websites under the assumption that a more effective heuristic will tend to produce results that correlate more highly with institutional research productivity.

Jeyshankar & Ramesh Babu (2009) have examined websites of 45 universities in Tamil Nadu comprising of 27 state and 18 private universities. This study identifies the domain systems of the websites; analysis the number of

WebPages, link pages and calculates the Simple Web Impact Factor, Self Link Web Impact Factor, External Link Web Impact Factor and Revised Web Impact Factor of the university websites in Tamil Nadu and ranks the websites as per the WIF. Reflects that some universities in Tamil Nadu have higher number of WebPages but correspondingly their link pages are very small in number and websites fall behind in their simple, self link and external link web impact factor.

Mukherjee (2009) applied the webometric techniques to national political party's websites, and judge the popularity of internet and to measure whether internet can be used as a tool in Indian political context. Using Google, Yahoo and Alexa as a tool for measurement, the study measures the popularity of political party's websites by analyzing links and using Wayback machine. The study compares the part's present website with its earlier view. The results indicate that political parties in India are using internet as one of the viable tools for campaign and internet can be used as a supplementary tool for measuring popularity.

Ramesh Babu, Jeysankar & Nageswara Rao (2010) examined 40 central universities websites in India. 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 for Central universities in India and ranks the websites as per the WIF. It also develops a novel network diagram showing link structures between web nodes in webometric analysis. This study warns against taking the analogy between citation analysis and link analysis too far.

Jeysankar (2011) studied webometrics is concerned with measuring aspects of the web: domain, web sites, web pages, parts of web pages, words in web pages, hyperlinks, self links, external links, inlinks, web search engine results and Web Impact Factor. There has been much recent interest in extracting information from collections of web links and WIFs. It has been demonstrated that several versions of this metric can produce results that correlate with the various WIFs ratings of 27 nationalized banks websites in India showing that, despite being a measure of a purely Internet phenomenon, the results are susceptible to a wider interpretation. This study

shows topology frame work / link network of Reserve Bank of India and linking the different nodes of nationalized banks websites in India.

Maria Sujitha & Jeyshankar (2013) were analysed the web pages of Indian Institute of Technology websites retrieved by commercial search engine and tested by Histogram, Scatter Plot and the Line of Best Fit for its reliability and then by Regression Analysis with the help of SPSS 17.0 package and it is found that External Link Web pages provides more than other link pages.

Webometrics is a new concept in Library and Information Science in the order of Librametry, Bibliometrics,

5 Scope of the Study

This study examined and explored into the webometric study of CSIR research institutions Websites of India. There are 41 CSIR research institutions in India. Therefore this study examined the websites of 41 CSIR research institutions in India. The study aimed at to establish a kind of ranking of websites of CSIR research institutions in India by measuring their WIF. The study of the ranking will help the reader to compare and identify CSIR research institutions websites in India by their WIF.

6 Objectives

The objectives of the study are as follows:

1. To trace and classify the domain of CSIR research institutes' websites in India;
2. To calculate the Number of WebPages, Number of link pages, Number of self link pages and external link pages of CSIR research institutes' websites in India;
3. To calculate the Simple Web Impact Factor (WIF), Self link Web Impact Factor, External Web Impact factor and Revised Web Impact Factor of CSIR research institutes'' websites in India and rank them as per the WIF and
4. To assess and analyse the link network of the CSIR' websites in India.

7 Methodologies

The following methodology has been adopted in this study:

7.1 Data Collection

This study used Exalead (<http://www.exalead.com/search/web/>) search engine for collecting data. Exalead advanced web queries was used to find the approximate number of pages in each website that link to one another. The Exalead query is based upon the lexicon of the domain names of webpage URLs. The Exalead has been used to search and collect data. The data collection method extensively makes use of four special key words like **domain**, **linkdomain**, **linkdomain AND**, **linkdomain AND NOT** and **linkdomain NOT**: from Exalead Search engines. The four Boolean search statement methods used to collect data for each CSIR research institutes' websites are as follows:

- **domain:csir.res.in** – Extract the number of WebPages at the website under www.csir.res.in.
- **linkdomain:csir.res.in** – Reveals the number of link WebPages linking to the website under www.csir.res.in. It is called hyperlink pages.
- **linkdomain:csir.res.in AND domain:csir.res.in** - It provides a complete report of number of WebPages under www.csir.res.in; which provides hyperlinks to this website www.csir.res.in; it is called self – links pages (links from the same website).
- **linkdomain:csir.res.in AND NOT domain:csir.res.in** - It provides the report of number of pages not under www.csir.res.in. It is called external - link pages.
- **linkdomain:csir.res.in NOT domain:csir.res.in** – Reveals the number of links incoming from other websites. It is called inlink pages.

7.2 Web Impact Factor

WIF is a part of the methodology of webometrics. The idea of measuring Web Impact Factor (WIF) as one of the quantitative indicators (or the average link frequencies) was developed by Ingwersen (1998). WIF is a 'snapshot' of a search engine database at a specific time. Broadly, it is a measure of the extent to which it is linked to and recognized by other sites. The WIF is a form of measurement used to determine the relative standing of web sites in particular fields, or a country; for

instance, academic web sites in a country. The higher the impact factor, the greater the perceived reputation of the web site.

The idea of applying Revised WIF techniques to the web was proposed by Noruzi (2006). According to them WIF defined as the ratio of links made to a website, to the number of pages at the website. The WIF provides quantitative tools for ranking, evaluating, categorizing, and comparing web sites, top-level domains and sub-domains. Four types of links and Web Impact Factors are formulated in the following way:

- The Simple WIF, the ratio of all links to the number of pages.
- The Self Link WIF, the ratio of selflinks within the site to number of pages.
- The external WIF, the ratio of links made from external sites to the target site, to the number of pages at the site.
- The Revised WIF, the ratio of links made incoming from other sites.

8. Data Analysis and Interpretation

The results of the analyses are presented in the form of tables and diagrams under the following ten broad categories of webometric indicators:

Table 2
Classification of CSIR Websites Research Institutes by the domain Extensions

Sl. No	Domain	No. of CSIR Research Institutes (n = 41)	%
1	.res.in	20	48.78
2	.org	16	39.02
3	.gov.in	2	4.88
4	.com	2	4.88
5	.ernet.in	1	2.44
Total		41	100.00

Table 2 reveals that, three types of ‘domain extensions’ were observed in this study. Almost one third of the CSIR research institutes web sites have ‘.res.in’ (48.78%) extension, followed by ‘.org’ (39.02%), both ‘.govt.in’ and ‘.com’(4.88%) extensions in two CSIR research institutes. Bothe the .res.in and .org contribute the maximum percentage of 87.80.

Table 3
Simple Web Impact Factor for CSIR Research Institutes of India

S. No.	Name of the Research Institutes (n = 41)	NWP	LWP	SWIF	Ranked by SWIF
1	Industrial Toxicology Research Centre	36	559	15.53	1
2	Central Building Research Institute	25	280	11.20	2
3	Central Mechanical Engineering Research Institute	15	131	8.73	3
4	National Geophysical Research Institute	11	53	4.82	4
5	Central Institute of Medicinal and Aromatic Plants	372	1500	4.03	5
6	Central Leather Research Institute	164	650	3.96	6
7	National Botanical Research Institute	228	887	3.89	7
8	National Institute of Oceanography	2330	7320	3.14	8
9	Central Scientific Instruments Organisation	6	18	3.00	9
10	Indian Institute of Integrative Medicine(IIIM)	15	45	3.00	9
11	Central Food Technological Research Institute	598	1620	2.71	10
12	Central Fuel Research Institute	54	139	2.57	11
13	Central Mining Research Institute	10	23	2.30	12
14	Indian Institute of Petroleum	308	705	2.29	13
15	CSIR Unit for Research and Development of Information Products	28	60	2.14	14
16	Central Drug Research Institute	907	1900	2.09	15
17	CSIR Madras Complex, Chennai	107	207	1.93	16
18	Centre for Cellular & Molecular Biology	1760	3390	1.93	16
19	National Institute for Interdisciplinary Science & Technology	391	750	1.92	17
20	Indian Institute of Chemical Technology	667	1263	1.89	18
21	National Institute of Science Communication and Information Resources	5920	11200	1.89	18
22	National Environmental Engineering Research Institute	1010	1810	1.79	19
23	North - East Institute of Science and Technology	328	561	1.71	20
24	National Aerospace Laboratories	1880	3020	1.61	21
25	National Chemical Laboratory	2500	4000	1.60	22
26	Institute of Himalayan Bio-resource Technology	1190	1830	1.54	23
27	Structural Engineering Research Centre	484	711	1.47	24
28	Institute of Minerals and Materials Technology(IMMT)	522	726	1.39	25
29	Central Electronics Engineering Research Institute	286	393	1.37	26
30	National Metallurgical Laboratory	577	779	1.35	27
31	National Physical Laboratory	1890	2470	1.31	28
32	Central Road Research Institute	273	335	1.23	29
33	Indian Institute of Chemical Biology	827	937	1.13	30
34	Institute of Genomics and Integrative Biology	1030	1130	1.10	31
35	CSIR Centre for Mathematical Modelling & Computer Simulation	3210	3470	1.08	32
36	Central Electrochemical Research Institute	1090	1160	1.06	33
37	National Institute of Science Technology & Development Studies	552	570	1.03	34
38	Central Salt & Marine Chemical Research Institute	685	688	1.00	35
39	Central Glass and Ceramic Research Institute	338	311	0.92	36
40	Advanced Materials and Processes Research Institute	210	166	0.79	37
41	Institute of Microbial Technology	9670	5300	0.55	38

The table 3 illustrates the rank distribution of CSIR research institutes in India according to their Simple Web Impact Factor (SWIF). Dividing the number of link pages by number of webpages, the Simple Web Impact Factor for each CSIR research institute has been calculated. Industrial Toxicology Research Centre occupies the first place with 15.53% Simple Web Impact Factor. The second and third place goes to Central Building Research Institute and Central Mechanical Engineering Research Institute respectively. Institute of Microbial Technology (9670) and National Institute of Science Communication and Information Resources (5920) have more number of webpages than the above three CSIR research institutes, but they are ranked 38th and 18th place respectively based on their SWIF.

The ranking of CSIR Research Institutes in India is based on their Self Link Web Impact Factor as shown in the table 4. National Institute of Science Communication and Information Resources occupies the first place with 2240 self link pages, and 5920 webpages with 10.67 SLWIF. Institute of Microbial Technology and National Physical Laboratory are ranked the 2nd and third places with SLWIF of 5.86 and 5.48 respectively. Though Centre for Mathematical Modelling & Computer Simulation has more number of webpages than 3rd, 4th 5th and 6th CSIR Research Institutes. , it occupies the 7th position. Because the numbers of Self link pages are very less compared to its web pages and its SLWIF is 4.21. Further Structural Engineering Research Centre, Chennai, Indian Institute of Petroleum share the 19th position with SLWIF as 0.97. The National Geophysical Research Institute and Central Scientific Instruments Organisation do have no link pages.

Table 4
Self Link Web Impact Factor for CSIR Research Institutes of India

S. No.	Name of the Research Institutes (n = 41)	NWP	SLWP	SLWIF	Ranked by SWIF
1	National Institute of Science Communication and Information Resources	5920	2240	10.67	1
2	Institute of Microbial Technology	9670	1230	5.86	2
3	National Physical Laboratory	1890	1150	5.48	3
4	National Environmental Engineering Research Institute	1010	1130	5.38	4
5	National Chemical Laboratory	2500	1110	5.29	5
6	Centre for Cellular & Molecular Biology	1760	897	4.27	6
7	CSIR Centre for Mathematical Modeling & Computer Simulation	3210	884	4.21	7
8	National Institute of Oceanography	2330	756	3.60	8

9	National Aerospace Laboratories	1880	453	2.16	9
10	Central Salt & Marine Chemical Research Institute	685	439	2.09	10
11	Central Drug Research Institute	907	371	1.77	11
12	National Institute of Science Technology & Development Studies	552	365	1.74	12
13	Central Electrochemical Research Institute	1090	330	1.57	13
14	Institute of Minerals and Materials Technology(IMMT)	522	328	1.56	14
15	Indian Institute of Chemical Biology	827	224	1.07	15
16	Indian Institute of Chemical Technology	667	222	1.06	16
17	Institute of Himalayan Bio-resource Technology	1190	222	1.06	17
18	National Metallurgical Laboratory	577	215	1.02	18
19	Structural Engineering Research Centre, Chennai	484	204	0.97	19
20	Indian Institute of Petroleum	308	203	0.97	19
21	Central Institute of Medicinal and Aromatic Plants	372	202	0.96	20
22	National Botanical Research Institute	228	185	0.88	21
23	North - East Institute of Science and Technology	328	179	0.85	22
24	Central Food Technological Research Institute	598	165	0.79	23
25	Central Road Research Institute	273	148	0.70	24
26	Central Glass and Ceramic Research Institute	338	137	0.65	25
27	Advanced Materials and Processes Research Institute	210	110	0.52	26
28	National Institute for Interdisciplinary Science & Technology	391	86	0.41	27
29	Institute of Genomics and Integrative Biology	1030	81	0.39	28
30	Central Leather Research Institute	164	79	0.38	29
31	CSIR Madras Complex, Chennai	107	59	0.28	30
32	Central Electronics Engineering Research Institute	286	37	0.18	31
33	Central Fuel Research Institute	54	31	0.15	32
34	Industrial Toxicology Research Centre	36	21	0.10	33
35	CSIR Unit for Research and Development of Information Products	28	15	0.07	34
36	Central Mechanical Engineering Research Institute	15	10	0.05	35
37	Indian Institute of Integrative Medicine(IIIM)	15	9	0.04	36
38	Central Building Research Institute	25	6	0.03	37
39	Central Mining Research Institute	10	3	0.01	38
40	National Geophysical Research Institute	11	0	0.00	39
41	Central Scientific Instruments Organisation	6	0	0.00	39

Table 5
External Link Web Impact Factor for CSIR Research Institutes of India

S. No.	Name of the Research Institutes (n = 41)	NWP	ELWP	EWIF	Ranked by EWIF
1	National Physical Laboratory	1890	1060	0.56	1
2	Central Salt & Marine Chemical Research Institute	685	287	0.42	2
3	National Botanical Research Institute	228	66	0.29	3
4	National Institute of Science Technology & Development Studies	552	150	0.27	4
5	Central Mechanical Engineering Research Institute	15	3	0.20	5
6	Central Drug Research Institute	907	160	0.18	6
7	National Institute of Science Communication and Information Resources	5920	900	0.15	7
8	Centre for Cellular & Molecular Biology	1760	265	0.15	7

9	Central Electrochemical Research Institute	1090	147	0.13	8
10	North - East Institute of Science and Technology	328	44	0.13	8
11	Central Leather Research Institute	164	21	0.13	8
12	Indian Institute of Petroleum	308	37	0.12	9
13	National Metallurgical Laboratory	577	63	0.11	10
14	Central Road Research Institute	273	29	0.11	10
15	Central Mining Research Institute	10	1	0.10	11
16	Central Glass and Ceramic Research Institute	338	32	0.09	12
17	Central Institute of Medicinal and Aromatic Plants	372	34	0.09	12
18	CSIR Madras Complex, Chennai	107	9	0.08	13
19	Indian Institute of Chemical Biology	827	59	0.07	14
20	National Environmental Engineering Research Institute	1010	67	0.07	14
21	Institute of Minerals and Materials Technology(IMMT)	522	34	0.07	14
22	Advanced Materials and Processes Research Institute	210	13	0.06	15
23	National Institute of Oceanography	2330	130	0.06	15
24	Central Fuel Research Institute	54	3	0.06	15
25	Central Food Technological Research Institute	598	32	0.05	16
26	CSIR Centre for Mathematical Modelling & Computer Simulation	3210	166	0.05	16
27	Indian Institute of Chemical Technology	667	32	0.05	16
28	National Aerospace Laboratories	1880	86	0.05	16
29	Central Electronics Engineering Research Institute	286	12	0.04	17
30	Structural Engineering Research Centre, Chennai	484	19	0.04	17
31	CSIR Unit for Research and Development of Information Products	28	1	0.04	17
32	Institute of Microbial Technology	9670	321	0.03	18
33	National Chemical Laboratory	2500	79	0.03	18
34	Institute of Himalayan Bio-resource Technology	1190	35	0.03	18
35	Industrial Toxicology Research Centre	36	1	0.03	18
36	National Institute for Interdisciplinary Science & Technology	391	6	0.02	19
37	Institute of Genomics and Integrative Biology	1030	6	0.01	20
38	Indian Institute of Integrative Medicine(IIIM)	15	0	0.00	21
39	Central Building Research Institute	25	0	0.00	21
40	National Geophysical Research Institute	11	0	0.00	21
41	Central Scientific Instruments Organisation	6	0	0.00	21

Table 5 reveals the rank distribution of CSIR Research Institutes in India according to their External Link Web Impact Factor (ELWIF). National Physical Laboratory occupies the first place with 1890 webpages, 1060 link pages and its ELWIF is 0.56. Central Salt & Marine Chemical Research Institute is in the 2nd position with the ELWIF as 0.42. National Institute of Science Communication and Information Resources and Centre for Cellular & Molecular Biology have been ranked 7th and the ELWIF has been arrived at 0.15. Central Electrochemical Research Institute, North - East Institute of Science and Technology and Central Leather Research Institute are positioned at the 8th place with the ELWIF as 0.13. The Indian Institute of Integrative Medicine, Central Building Research Institute, National

Geophysical Research Institute, Central Scientific Instruments Organisation do not have external link pages, so it occupied last position. Many CSIR research institutes occupied the same positions.

The data in table 6 exhibits the rank distribution of CSIR research institutes in India according to their Revised Web Impact Factor (RWIF). National Physical Laboratory ranked first with 1890 webpages, 1060 inlink pages and its RWIF is 0.56%. Central Salt & Marine Chemical Research Institute and National Botanical Research Institute occupy the 2nd and 3rd positions with the RWIF as 0.42 and 0.29 respectively. The Central Building Research Institute, Central Mining Research Institute, Central Mining Research Institute, Central Scientific Instruments Organisation, Indian Institute of Integrative Medicine and National Geophysical Research Institute do not have inlink pages, so they occupied last position. Many CSIR research institutes occupied the same positions.

Table 6
Revised Web Impact Factor for CSIR Research Institutes of India

S. No.	Name of the Research Institutes (n = 41)	NWP	ILWP	RWIF	Ranked by RWIF
1	National Physical Laboratory	1890	1060	0.56	1
2	Central Salt & Marine Chemical Research Institute	685	286	0.42	2
3	National Botanical Research Institute	228	65	0.29	3
4	National Institute of Science Technology & Development Studies	552	122	0.22	4
5	Central Drug Research Institute	907	164	0.18	5
6	Centre for Cellular & Molecular Biology	1760	267	0.15	6
7	Central Electrochemical Research Institute	1090	153	0.14	7
8	Indian Institute of Petroleum	308	32	0.10	8
9	Central Road Research Institute	273	28	0.10	8
10	Central Glass and Ceramic Research Institute	338	34	0.10	8
11	National Metallurgical Laboratory	577	56	0.10	8
12	Institute of Microbial Technology	9670	897	0.09	9
13	Central Institute of Medicinal and Aromatic Plants	372	32	0.09	9
14	Indian Institute of Chemical Biology	827	63	0.08	10
15	Central Leather Research Institute	164	12	0.07	11
16	Institute of Minerals and Materials Technology	522	37	0.07	11
17	National Institute of Science Communication and Information Resources	5920	350	0.06	12
18	Advanced Materials and Processes Research Institute	210	12	0.06	12
19	Central Food Technological Research Institute	598	34	0.06	12
20	Industrial Toxicology Research Centre	36	2	0.06	12
21	CSIR Centre for Mathematical Modeling & Computer Simulation	3210	176	0.05	13
22	National Environmental Engineering Research Institute	1010	55	0.05	13
23	National Institute of Oceanography	2330	124	0.05	13

24	Indian Institute of Chemical Technology	667	33	0.05	13
25	National Aerospace Laboratories	1880	90	0.05	13
26	Structural Engineering Research Centre, Chennai	484	22	0.05	13
27	CSIR Madras Complex, Chennai	107	4	0.04	14
28	Central Fuel Research Institute	54	2	0.04	14
29	North - East Institute of Science and Technology	328	12	0.04	14
30	CSIR Unit for Research and Development of Information Products	28	1	0.04	14
31	Institute of Himalayan Bioresource Technology	1190	41	0.03	15
32	Central Electronics Engineering Research Institute	286	9	0.03	15
33	National Chemical Laboratory	2500	40	0.02	16
34	National Institute for Interdisciplinary Science & Technology	391	3	0.01	17
35	Institute of Genomics and Integrative Biology	1030	4	0.0001	18
36	Central Building Research Institute	25	0	0.00	19
37	Central Mechanical Engineering Research Institute	15	0	0.00	19
38	Central Mining Research Institute	10	0	0.00	19
39	Central Scientific Instruments Organisation	6	0	0.00	19
40	Indian Institute of Integrative Medicine (IIIM)	15	0	0.00	19
41	National Geophysical Research Institute	11	0	0.00	19

LINK NETWORK OF COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH WEBSITES IN INDIA

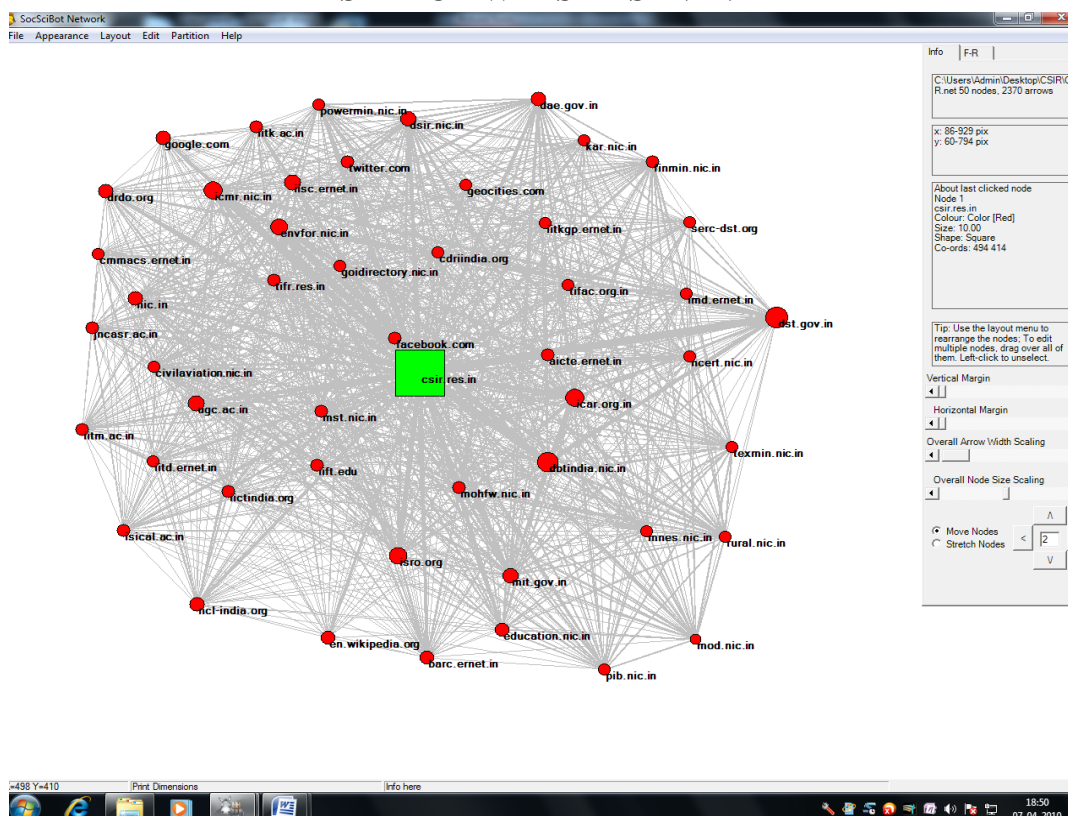


Figure 1: Link Network Diagram – Links between Two or More Websites by CSIR website in India

The Fig.1 reveals the visual map demonstration links (LexiURL Serarcher, 2018) (only site links were mapped) Council of Scientific and Industrial Research websites further indicates that CSIR research institutes in India has closed link to some department or other institutions, government departments, international organizations, information sources of websites etc linked with CSIR research institutes in India. It also has developed linking with UGC, AICTE, NCERT, DRDO, ISRO, IISC, NIC, Google, geocites, Wikipedia, face book etc and some other sites.

8. Major Findings and Conclusion

This study has some important lessons for authorities of CSIR research institutes and some interesting facts are found from the central universities web sites. The following are the major findings:

- It is found that there are 41 CSIR research institutes in India. Among them all CSIR research institutes have the website; Delhi has the maximum of five CSIR research institutes, Tamil Nadu and Uttar Pradesh have four CSIR research institutes.
- It is also found that among 41 CSIR research institutes websites, 20 research institutes have the *.res.in* domain.
- It is obvious that Industrial Toxicology Research Centre stands first in ranking based on the Simple Web Impact Factor.
- National Institute of Science Communication and Information Resources is in the first place based on the Self Link Web Impact Factor followed by Institute of Microbial Technology and National Physical Laboratory.
- It is found that National Physical Laboratory and Central Salt & Marine Chemical Research Institute are at the 1st and 2nd positions respectively based on their External Link Web Impact Factor. It is also found that the first place is occupied by National Physical Laboratory according to its Revised Web Impact Factor.
- It also observed that though Institute of Microbial Technology have more number of webpages than the all other central universities, they did not occupy the leading position. Because its link pages are comparatively less than its webpages.

Link analysis of the websites of CSIR research institutes in India is an unexplored area of webometric research. This study gives a fair indication of their

web impact factor which can be used as tool for knowing their position. These findings of link interpretation are required for any link analysis exercise if conclusions are to be drawn about underlying reasons for link creation – for e.g. the research institute websites which receive more links from other research institutes websites will provide more information to their user.

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APPENDIX

Sl. No	Name & Locations of CSIR Research Institutes	URLs
1	National Physical Laboratory, Delhi	www.nplindia.org
2	Central Salt & Marine Chemical Research Institute, Gujarat	www.csmcri.org
3	National Botanical Research Institute, Uttar Pradesh	www.nbri-lko.org
4	National Institute of Science Technology & Development Studies, Delhi	www.nistads.res.in
5	Central Drug Research Institute, Uttar Pradesh	www.cdriindia.org
6	Centre for Cellular & Molecular Biology, Andhra Pradesh	www.ccmb.res.in
7	Central Electrochemical Research Institute, Tamil Nadu	www.cecri.res.in
8	Indian Institute of Petroleum, Uttaranchal	www.iip.res.in
9	Central Road Research Institute, Delhi	www.crridom.gov.in
10	Central Glass and Ceramic Research Institute, West Bengal	www.cgcri.res.in
11	National Metallurgical Laboratory, Jharkhand	www.nmlindia.org
12	Institute of Microbial Technology, Punjab	www.imtech.res.in
13	Central Institute of Medicinal and Aromatic Plants, Uttar Pradesh	www.cimap.res.in
14	Indian Institute of Chemical Biology, West Bengal	www.iicb.res.in
15	Central Leather Research Institute, Tamil Nadu	www.clri.org
16	Institute of Minerals and Materials, Technology, Orissa	www.immt.res.in
17	National Institute of Science Communication and Information Resources, Delhi	www.niscair.res.in
18	Advanced Materials and Processes Research Institute, Madhya Pradesh	www.ampri.res.in
19	Central Food Technological Research Institute, Karnataka	www.cftri.com
20	Industrial Toxicology Research Centre, Uttar Pradesh	www.itrcindia.org
21	CSIR Centre for Mathematical Modeling & Computer Simulation, Karnataka	www.cmmacs.ernet.in
22	National Environmental Engineering Research Institute, Maharashtra	www.neeri.res.in
23	National Institute of Oceanography, Goa	www.nio.org
24	Indian Institute of Chemical Technology, Andhra Pradesh	www.iictindia.org
25	National Aerospace Laboratories, Karnataka	www.nal.res.in
26	Structural Engineering Research Centre, Chennai, Tamil Nadu	www.sercm.org
27	CSIR Madras Complex, Chennai, Tamil Nadu	www.csirmadrascomplex.gov.in
28	Central Fuel Research Institute, Jharkhand	www.cfrindia.com
29	North - East Institute of Science and Technology, Assam	www.rljorhat.res.in
30	CSIR Unit for Research and Development of Information Products, Maharashtra	www.urdip.res.in
31	Institute of Himalayan Bio-resource Technology, Himachal Pradesh	www.ihbt.res.in
32	Central Electronics Engineering Research Institute, Rajasthan	www.ceeri.res.in
33	National Chemical Laboratory, Maharashtra	www.ncl-india.org
34	National Institute for Interdisciplinary Science & Technology, Kerala	www.niist.res.in
35	Institute of Genomics and Integrative Biology, Delhi	www.igib.res.in
36	Central Building Research Institute, Uttaranchal	www.cbri.org
37	Central Mechanical Engineering Research Institute, West Bengal	www.cmeri.org
38	Central Mining Research Institute, Jharkhand	www.cmriindia.org
39	Central Scientific Instruments Organisation, Punjab	www.csio.org
40	Indian Institute of Integrative Medicine (IIIM), J & K	www.iiim.res.in
41	National Geophysical Research Institute, Andhra Pradesh	www.ngri.org

