Web Link Analysis of R &D Institutions in Karnataka

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ABSTRACT

The present study aims to identify and analyze websites of R&D Institutions in Karnataka and calculate the number of web pages, and external and internal links, calculate the web impact factor of websites, identify the web influenced, and rank the R&D Institutions of Karnataka based on their web impact factor. This study primarily examines and explores through the webometric study of websites of Research Institutions in Karnataka. Data analysis is done by using different factors such as page links, domain links, site links, directory links, and web impact factors. The web impact factor is the major factor in ranking the R and D institutions using the impact factor formula.

KEYWORDS: Webometrics ; Cybermetrics; Link analysis; Research and Development Institutions

INTRODUCTION

In 1997 the word Webometrics was coined by Ingeverson[1] in the Journal of Documentation for the first time according to Webometrics means qualitative and quantitative analysis of webpages of websites. Webometrics is presently one of the main research topics in the discipline of Library and Information science or cyberspace. Nowadays it has gained momentum just because of the number of publications published in electronic formats like databases, Institutional repositories, web pages of websites, Personal homepages, and social networks also display a large amount of data on their websites. In this large Information bunch very difficult to assess the quality of information online, Webometrics ease the hectic job of analyzing the contents and quality of information in the webpages. William Paisley rightly said that the next future information available in the form of electronic files and studies will be on Informatics.

In this study, we used the web crawler Socscibot[3] software to crawl the data from various websites of Research and development institutions in Karnataka software developed by Mike Thelwall[4] and rank the websites using the web impact factor (IF) given by Ingverson[5]

The country's growth and development largely depend on research and innovation. The R&D institutions play a crucial role in the growth of new information resources and new technologies. For dissemination of the activities of

any R&D institution's websites are very important so almost all institutions have websites. Websites are now widely used as one of the primary means of disseminating research findings and information. To know how effective these websites are, webometrics studies will help much.

The present study is intended to show how webometric techniques could be applied to website link analysis for research institutions in Karnataka.

OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- ✓ To identify and analyze websites of R&D Institutions in Karnataka
- ✓ To calculate the number of web pages, and external and internal links of R&D Institutions.
- ✓ To calculate the web impact factor of web websites of R&D Institutions
- ✓ To identify how the web influenced on the R&D Institutions have?
- ✓ To know which are the most targeted R&D Institutions in Karnataka?
- ✓ To rank the R&D Institutions of Karnataka based on their web impact factor.

METHODOLOGY

In this study, to select the research institutes the investigator has used the Directory of Indian Government Websites[6] and further research and development institutions within Karnataka has selected**.**

The SocSciBot computer software and the SocSciBottoolkit were respectively used to crawl through R&D Institution's websites of Karnataka and analyze collected data. According to Omwoyo Bosire Onyancha and Dennis N. Ocholla[7] SocSciBot is a website crawler that is specially designed for research purposes. The software was chosen based on its extensive use for site analysis and its user-friendliness. It also generates some reports, some of which were the subject of discussion of this study.

The idea of measuring Web Impact factor (WIF) was given by Ingversion[3], as one of the quantitative indicators (or the average link frequencies) WIFs are part of the methodology of webometrics. The WIF is a form of measurement used to determine the relative standing of websites in particular fields, or a country. Data analysis is done by using different factors such as page links, domain links, site links, directory links, and web impact factors. The web impact factor is a major factor in ranking the R & D institutions using the impact factor formula**:** WIF= Total No. of Out Links /Total No. of Web pages

RESULTS

Table 1. Compilation of R&D Institutions with their URLs and domain names

Sl. No.	Name of the Institute	URLs	Domain name
1.	Central Food Technological Research Institute(CFTRI)	http://www.cftri.com/	cftri.com
2.	Centre for Liquid Crystal Research(CLCR)	http://www.clcr.res.in/	clcr.res.in

3.	CSIR Centre for Mathematical Modelling and Computer Simulation (C-MMACS)	http://www.cmmacs.ernet.in/	cmmacs.ernet.in
4.	Central Seri cultural Research & Training Institute (CSRTI)	http://www.csrtimys.res.in/	csrtimys.res.in
5.	Hindustan Aeronautics Limited(HAL)	http://www.hal-india.com/	hal-india.com
6.	Indian Academy of Sciences(IAS)	http://www.ias.ac.in/	ias.ac.in
7.	Institute of Bioinformatics and Applied Biotechnology(IBAB)	http://www.ibab.ac.in/	ibab.ac.in
8.	Indian Institute of Astrophysics(IIA)	http://www.iiap.res.in/	iiap.res.in
9.	Indian Plywood Industries Research and Training Institute(IPIRTI)	http://www.ipirti.gov.in/	ipirti.gov.in
10.	Indian Institute of Horticultural Research(IIHR)	http://www.iihr.res.in/	iihr.res.in
11.	Indian Institute of Science(IIS)	http://www.iisc.ernet.in/	iisc.ernet.in
12.	Institute for Social and Economic Change(ISEC)	http://www.isec.ac.in/	isec.ac.in
13.	Indian Space Research Organization(ISRO)	http://www.isro.org/	isro.org
14.	Indian Statistical Institute(ISI)	http://www.isibang.ac.in/	isibang.ac.in
15.	Jawaharlal Nehru Centre for Advanced Scientific Research(JNCASR)	http://www.jncasr.ac.in/	jncasr.ac.in
16.	Karnataka state Sericulture Research and Development Institute(KSSRDI)	http://www.kssrdi.org/	kssrdi.org
17.	National centre for biological sciences(NCBS)	http://www.ncbs.res.in/	ibab.ac.in
18.	National Institute of Mental Health and Neuro Sciences(NIMHANS)	http://www.nimhans.kar.nic.in/	nimhans.kar.nic.in
19.	National Institute of Technology Karnataka (NITK)	http://www.nitk.ac.in/	nitk.ac.in
20.	Raman Research Institute(RRI)	http://www.rri.res.in/	rri.res.in
21.	Shriram Institute for Industrial Research	http://www.shriraminstitute.org/	shriraminstitute.org
22.	Tata Institute of Fundamental Research(TIFR)	http://math.tifrbng.res.in/	math.tifrbng.res.in
23.	Vydehi Institute of Medical Sciences & Research Centre(VIMS)	http://www.vims.ac.in/	vims.ac.in

The above table reveals the compilation of R&D Institutions of Karnataka with their URLs and domain names. In total there are 23 R& D institutions were taken for the study given in the Government of India Web Directories, Karnataka.

Table2. Domain names and total number of out links of R&D Institutions

Sl. No.	Domain name	Out links	Rank by out links
1.	nitk.ac.in	564975	1
2.	iisc.ernet.in	257879	2
3.	iiap.res.in	233228	3
4.	jncasr.ac.in	176860	4
5.	ias.ac.in	76889	5
.	ncbs.res.in	22032	6
7.	vims.ac.in	20903	7
8.	isro.org	10816	8
9.	cmmacs.ernet.in	8870	9
10.	iihr.res.in	8838	10
11.	hal-india.com	7114	11
12.	isibang.ac.in	6647	12
13.	ibab.ac.in	2808	13
14.	isec.ac.in	2470	14
15.	shriraminstitute.org	1402	15
16.	rri.res.in	1357	16
17.	clcr.res.in	1068	17
18.	cftri.com	1024	18
19.	math.tifrbng.res.in	850	19
20.	csrtimys.res.in	814	20
21.	kssrdi.org	91	21
22.	ipirti.gov.in	1	22
23.	nimhans.kar.nic.in	0	23

Table3. Rank of R&D Institutions based on their web impact factor

Sl. No.	Domain name	Number of Webpages	Out links	WIF	Rank
1.	nitk.ac.in	3372	564975	167.5	1
2.	jncasr.ac.in	2312	176860	76.49	2
3.	vims.ac.in	543	20903	38.4	3

4.	iihr.res.in	239	8838	36.97	4
5.	shriraminstitute.org	39	1402	35.9	5
6.	ias.ac.in	2214	76889	34.72	6
7.	ncbs.res.in	661	22032	33.3	7
8.	iiap.res.in	8246	233228	28.28	8
9.	iisc.ernet.in	11678	257879	22.8	9
10.	ibab.ac.in	232	2808	12.10	10
11.	rri.res.in	114	1357	11.90	11
12.	hal-india.com	622	7114	11.4	12
13.	math.tifrbng.res.in	97	850	8.7	13
14.	clcr.res.in	124	1068	8.64	14
15.	isibang.ac.in	790	6647	8.41	15
16.	isro.org	1298	10816	8.33	16
17.	cmmacs.ernet.in	1707	8870	5.19	17
18.	csrtimys.res.in	189	814	4.30	18
19.	kssrdi.org	23	91	3.9	19
20.	cftri.com	264	1024	3.87	20
21.	isec.ac.in	699	2470	3.53	21
22.	ipirti.gov.in	2	1	0.5	22
23.	nimhans.kar.nic.in	1	0	0	23

The above table reveals that out of 23 R&D Institutions, Indian Institute of Science occupies first place with (82) number of total page links, Indian Academy of Science is the second place with the (48) total number of page links, Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Institute of Astrophysics, National centre for Biological Sciences are at the 3rd, 4th and 5th places with total page links of 20, 19 and 13 respectively. Indian Space Research Organization and National Institute of Technology Karnataka stands in the 9th position in this regard with total page links of 8 respectively. Centre for Liquid Crystal Research and Institute of Bioinformatics and Applied Biotechnology are in the middle position with a total page links of 3, these are at the 10th position. In the above table's mean value is 3 so the above mean value shows the total page links rank of the R&D Institutions. In the below mean value Central Food Technological Research Institute and Hindustan Aeronautics Limited occupy 12th
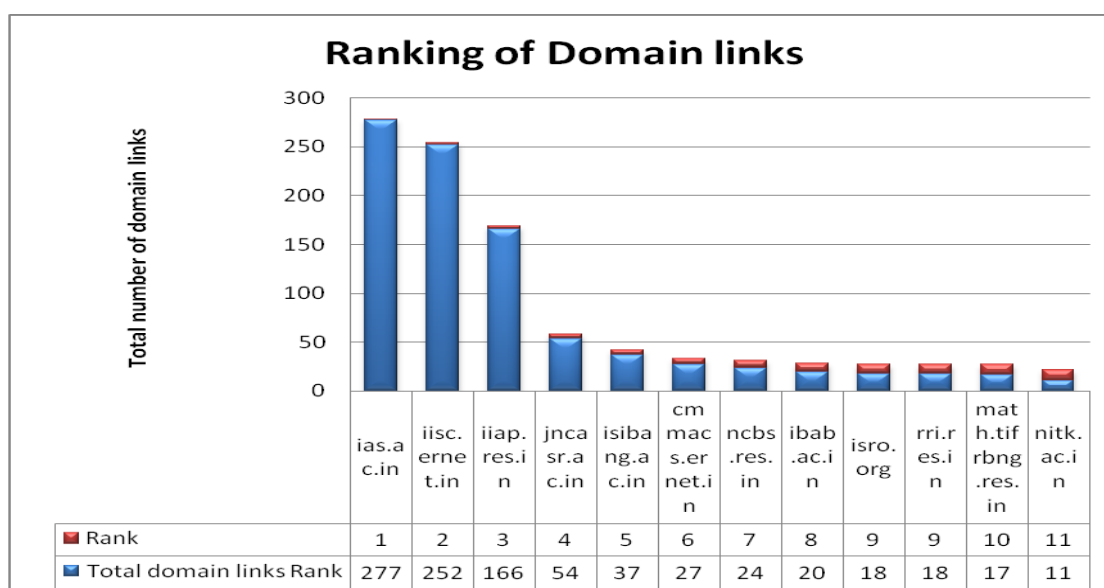
position. Indian Institute of Horticultural Research, Indian Plywood Industries Research and Training Institute, National Institute of Mental Health and Neuro Sciences, Vydehi Institute of Medical Sciences & Research Centre, Central Seri cultural Research & Training Institute, Shriram Institute for Industrial Research and Karnataka State Sericulture Research and Development Institute all are got last place with zero number of page links respectively.

**Site links rank of R&D Institutions**
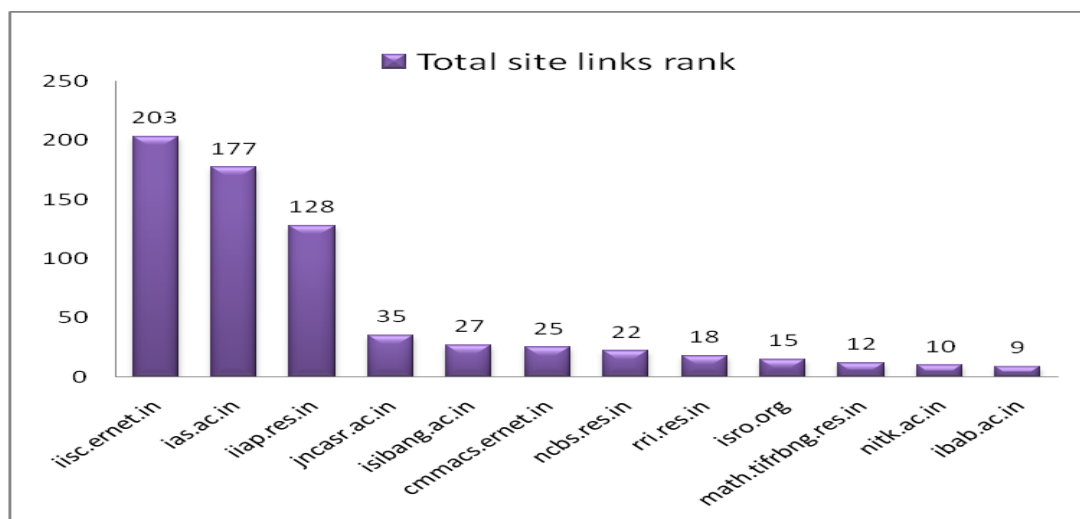
The chart two shows that Indian Institute of Science occupies first place with the (203) total number of site links, Indian Academy of Science is in second place with the (177) total number of site links. Indian Institute of Astrophysics, Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Statistical Institute, Centre for Mathematical Modeling and Computer Simulation, National centre for biological sciences, Raman Research Institute and Indian Space Research Organization are at the 3rd, 4th, 5th, 6th, 7th, 8th and 9th place with the total number of site links 128, 35, 27, 25, 22, 18, and 15 respectively. Here mean value is 9 so the National Institute of Technology Karnataka, Institute of Bioinformatics and Applied Biotechnology and Centre for Liquid Crystal Research and Institute of Bioinformatics and Applied Biotechnology stands in the middle position with a total number of site links 10, 9 and 8 in this regard.

Domain links rank of R&D Institutions

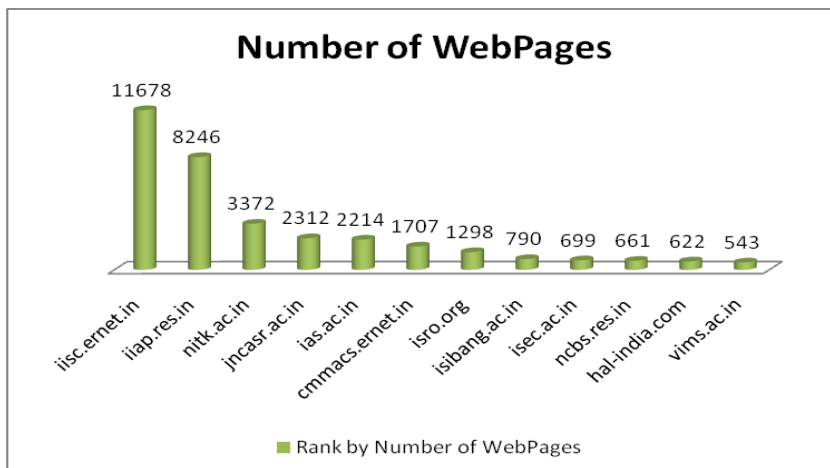|	ias.ac.in	iisc.ernet.in	iiap.res.in	jncasr.ac.in	isibang.ac.in	cmmacs.ernet.in	ncbs.res.in	ibab.ac.in	isro.org	rri.res.in	math.tifrbng.res.in	nitk.ac.in
Rank	1	2	3	4	5	6	7	8	9	9	10	11
Total domain links Rank	277	252	166	54	37	27	24	20	18	18	17	11

The chart three reveals that Indian Academy of Science occupies first place with the (277) total number of domain links, Indian institute of Science got 2nd place with the (252) number of domain links and Indian Institute of Astrophysics stood in 3rd place with (166) number of domain links. Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Statistical Institute, Centre for Mathematical Modelling and Computer Simulation, National centre for biological sciences, Institute of Bioinformatics and Applied Biotechnology are at the 4th, 5th, 6th, 7th and 8th with total domain links of 54, 37, 27, 24 and 20 respectively. National Institute of Technology Karnataka and Centre for Liquid Crystal Research are stood in middle position with a total number of domain links of 11, and 8 respectively. Finally Indian Institute of Horticultural Research, Indian Plywood Industries Research and Training, National Institute of Mental Health and Neuro Sciences, Vydehi Institute of Medical Sciences & Research Centre, Central Seri cultural Research & Training Institute, Shriram Institute for Industrial Research and Karnataka state Sericulture Research and Development Institute all are got last place i.e. 15th place in this regard with zero domain links.

**Directory links rank of R&D Institutions**
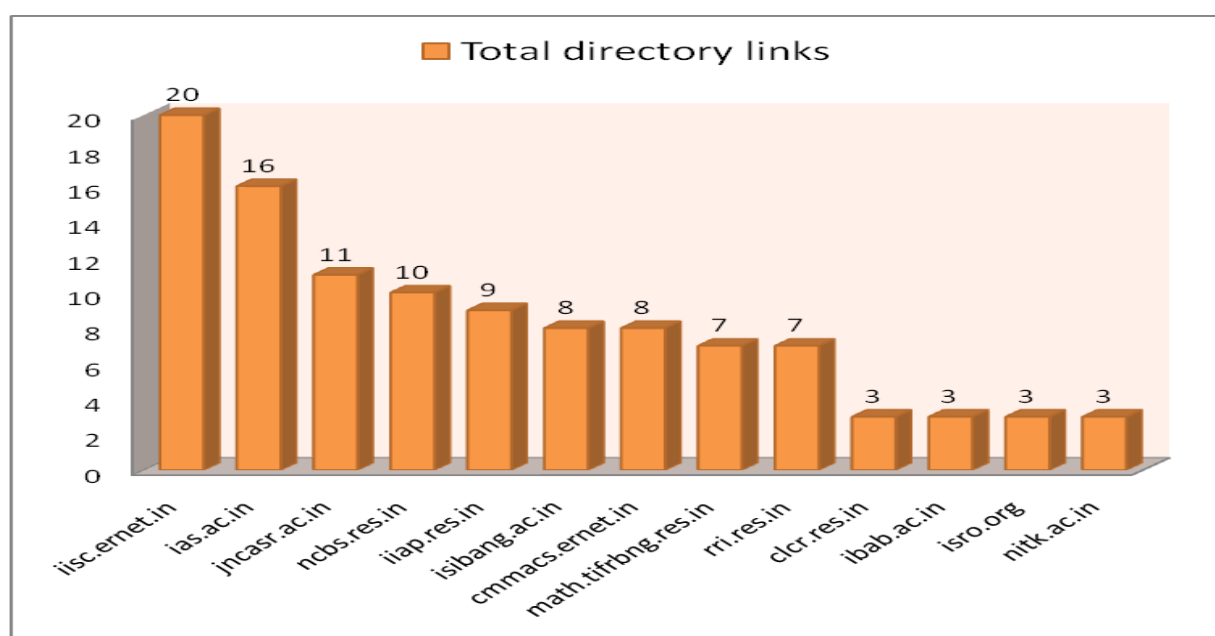
In this chart Indian Institute of Science got first place with the total number of (20) directory links, Indian Academy of Science occupies second place with the (16) total number of directory links and Jawaharlal Nehru Centre for Advanced Scientific Research, National centre for biological sciences, Indian Institute of Astrophysics are at 3rd, 4th and 5th with the total number of directory links is 11, 10 and 9 respectively. Centre for Liquid Crystal Research, Institute of Bioinformatics and Applied Biotechnology, Indian Space Research Organization and National Institute of Technology Karnataka stood in the middle position with a total number of directory links 3. Indian Institute of Horticultural Research, Indian Plywood Industries Research and Training, National Institute of Mental Health and Neuro Sciences, Vydehi Institute of Medical Sciences & Research Centre, Central Seri Cultural Research & Training Institute, Shriram Institute for Industrial Research and Karnataka State Sericulture Research and Development Institute all are got last i.e. 11th place in this regard with zero directory links.

Web Link Analysis of R & D Institutions in Karnataka

Rank of R&D Institutions based on their WebPages

This chart 6 gives the rank distribution as follows: Indian Institute of Science stood in first place in this regard with the highest number of web pages (11678). 2nd, 3rd, 4th and 5th position goes to Indian Institute of Astrophysics, National Institute of Technology Karnataka, Jawaharlal Nehru Centre for Advanced Scientific Research and Indian Academy of science with the web pages (8246), (3372), (2312), and (2214) respectively. Hindustan Aeronautics Limited, Vydehi Institute of Medical Sciences and Central Food Technological Research Institute stands in the middle place i.e. 11th, 12th and 13th with web pages of (622), (543) and (264) respectively. Finally, National Institute of Mental Health and Neuro Sciences got last place with only one web page.

Rank of R&D Institutions based on their web impact factor
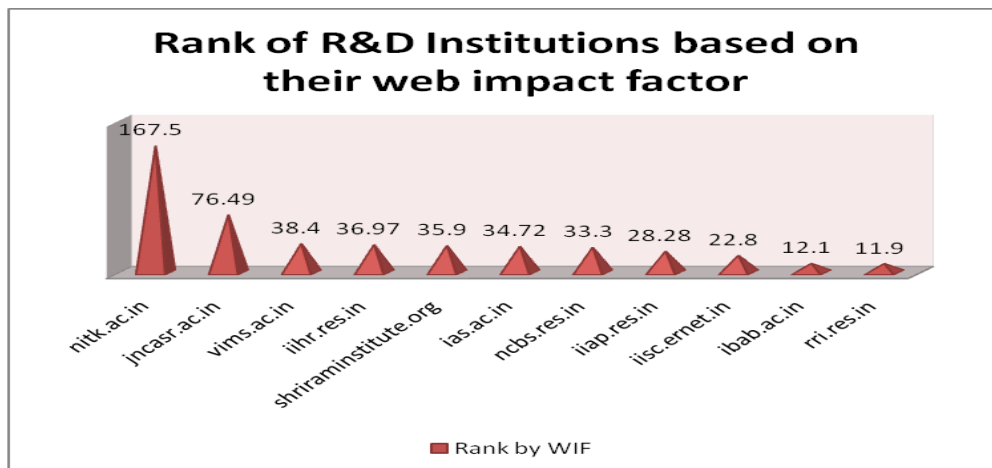
It is evident that National Institute of Technology Karnataka occupies the first place with a web impact factor of 167.5. Jawaharlal Nehru Centre for Advanced Scientific Research, Vydehi Institute of Medical Sciences, Indian Institute of Horticultural Research, Shriram Institute for Industrial Research, Indian Academy of Science and National Centre for Biological Sciences got 2nd, 3rd, 4th, 5th, 6th, and 7th with the web impact factor of 76.49, 38.4, 36.97, 35.9, 34.72, and 33.3 respectively. Indian Institute of Science got 9th position in this regard. Raman Research Institute, Hindustan Aeronautics Limited and Tata Institute of Fundamental Research are at middle place i.e. 11th, 12th and 13th with web impact factor of 11.90, 11.4, and 8.7 respectively. Indian Space Research The organization stood in 16th place with a web impact factor of 8.33. National Institute of Mental Health and Neuro Sciences is in last place because of having zero of its web impact factor.

FINDINGS AND CONCLUSION

This study has been exploratory and there is scope for future webometric research in this area. It would be useful to carry out a more comprehensive study comparing more institutions, compared with conventional publication output and indicators of economic and technological development.

This study identifies and analyzes websites, calculates the number of web pages, external and internal links, calculate the web impact factor of web websites, identify web influences on which are the most targeted and ranked the R&D Institutions of Karnataka based on their web impact factor.

It observed the following findings:

- National Institute of Technology Karnataka occupies first place by having the highest number of web pages as well as out links with a web impact factor of 167.5.

- While considering the page link and site link Indian Institute of Science stood in first place with the (82) number of total page links and (203) a total number of site links.

- ·In page link rank and site link rank Indian Academy of Science is in the second place with the (48) total number of page links and (177) a total number of site links.

- ·Indian Space Research Organization, National Institute of Technology Karnataka and Centre for Liquid Crystal Research are almost at the middle position in all types of links.

- ·Karnataka State Sericulture Research and Development Institute, Vydehi Institute of Medical Sciences & Research Centre and National Institute of Mental Health and Neuro Sciences are got last place because of having less number of links.

- ·National centre for biological sciences stood in 7th place from site links and domain links

This project conducted a study to identify and analyze websites, calculate the number of web pages, external and internal links, calculate the web impact factor of web websites, identify web influences which are the most targeted and ranked the R&D Institutions of Karnataka based on their web impact factor.

It of found from the study that R&D institutions have good web influence. In this study, most institutions have the highest number of web pages and outlines. Only a few institutions do not have many links on their websites.

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