
WEBSITES OF INDIAN INSTITUTES OF MANAGEMENT (IIMs): A WEBOMETRIC STUDY

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Abstract :

Webometrics is a new concept in Library and Information Science in the order of Librametry, Bibliometrics, Scientometrics, Informetrics, and Cybermetrics. This study enlist with 13 Indian Institute of Management (IIMs) in India and their links which subsidize Number of Web pages (NWP), Link Web Pages (LWP), Self-link Web Pages (SLWP), External Link Web Pages (ELWP) and Inlink Web Pages (ILWP) have been retrieved by specific commands in Google search engine. The Web Impact Factor of 13 institutes has been calculated by proportion to each web page with Number of Web pages and rank has assigned to each institute. The Number of Web Page has been taken as base due to its importance and Regression Analysis has been done on it. The result shows that Self-link Web Pages' contribution is more to the Number of Web Page of IIMs in India.

KEYWORDS :

Webometrics, Indian Institutes of Management (IIMs), Web pages, Web Impact Factor, Regression Analysis.

1.INTRODUCTION

Webometrics is a new concept in Library and Information Science in the order of Librametry, Bibliometrics, Scientometrics, Informetrics, and Cybermetrics . Webometrics is the combination of two words 'web' and 'metrics'. The term was coined for the quantitative analysis of web related phenomena as bibliometric evaluate the printed materials, Scientometrics deals with scientific publication, Informetrics treats with all types of information, and Cybermetrics is for social network analysis. The webometrics concentrates on the Construction and Usage sides of the Web which mainly cover four areas namely:

- a)Web page content analysis
- b)Web link structure analysis
- c)Web usage analysis and
- d)Web technology analysis (Ingwersen, 1998).

BASIC LINKTERMINOLOGY

Link creation motivation studies are vital for understanding of how counts of links should be interpreted, but nevertheless have tended to lag behind statistical correlation studies, although both are needed to validate link counts. According to this, most of the correlation based studies discussed some basic analysis of web pages in order to investigate factors related to motivation or anomalies. (Thelwall & Wilkinson, 2003)1

Webometrics studied about various links as follows:

- i.A link received by a Web node which may be Web page, Directory, Website etc., such links are termed as incoming link, inbound link, inward link, back link and citation.
- ii.Link pointing out of a website
- iii.Link pointing into a site.

Various studies have been carried out to study the link structure of Personal Web Crawlers and also to study the

Commercial Search Engines' link structure or Algorithms used to connect the webpages of similar interest and for the same connotation. The web is too well connected to allow the identification and extraction of small group pages by finding disconnected components of the Web graph such as Strongly Connected Component (SCC) can be very large. Still the research question unanswered as how web components or web clusters are formed while searching the contents related with particular webpage. (Sharma, 2005)²

2 INDIAN INSTITUTE OF MANagements: AN OVERVIEW

Indian Institutes of Managements (IIMs) are a group of 13 public, autonomous institutes of management education in India (Appendix). The establishment of IIMs was envisioned and initiated by Jawaharlal Nehru with the objective of providing quality management education. The administration of all IIMs and overall strategy of IIMs is overseen by the IIM council.

IIMs are registered as societies under the Indian Societies Registration Act. Even though each IIM engaged with their own independent control of day to day activities, the administration of all IIMs and the overall strategy is managed by the IIM council. The two-year Post Graduate Diploma in Management (PGDM) and Fellow Programme in Management (FPM) are considered to be equivalent to MBA and Ph. D., respectively.

Table 1: IIMs with the year of Establishment as on 2012

Sl.No	Year of Establishment	No. of IIMs
1	Between 1961-1970	2
2	Between 1971-1980	1
3	Between 1981-1990	1
4	Between 1991-2000	2
5	Between 2001-2010	4
6	After 2010	3
Total		13

The table shows that the existence IIMs in small quantity at first and it was slowly increased into high figure in the year recently.

3. OBJECTIVES

To examine the URLs of IIMs in India and to find out the Number of Web Pages

To find the number of Link Web pages (LWP), Self link Web pages (SLWP), External Link Web pages (ELWP) and Inlink Web pages (ILWP) in the URLs of IIMs in India.

To know whether the Number of Web pages (NWP) plays a predominant role of all web pages.

To know the contributions of all other Webpages to NWP is identical or not.

To find out the influence level of each independent variable (Link Web Pages, Self link Web pages, External Link Web pages and Inlink Web pages) with the dependent variable (Number of Web pages).

4. REVIEW OF RELATED LITERATURE

Moosung Lee and Han Woo Park (2012)³ attempted to discover a possible linkage between conventional university ranking and web links. The universities from English speaking countries had higher web visibility scores in all the indicators than non-English speaking counterparts.

Islam and Alam (2011)⁴ examined 44 private university websites in Bangladesh and identifies the number of webpages and link pages, and calculates the overall Web Impact Factor and Absolute Web Impact Factor by using AltaVista search engine. This study reveals some private universities have higher number but their link pages are very small in number thus the website fall behind in ranking. The information update and information in both English and local language facilitate more access by users has specified.

According to Isidro F. Aguillo et al. (2010)⁵ ranking of universities by set of similarity measurement can be taken into account of the study. The findings derived from comparing European Universities and of the Centre for Science and Technology Studies at Leiden University shows that there are reasonable similarities between the rankings, even though each applies a different methodology.

Changling Li and Xinjin Fu (2009)⁶ examined the Link Analysis of 15 government websites based on Factor Analysis. The study reveals that the Beijing Government website does the best among all websites. The website which is better and prior were also found out by the study and all other websites were given suggestions to improve their perfectness in the near future. The total link and eternal link have given good performance in the evaluation of websites.

Jeysankar, Ramesh Babu, B. and Gopalakrishnan, S (2009)⁷ explained basic frame work and development of webometrics from librametrics, informetrics, bibliometrics, scientometrics and cybermetrics. Jeysankar and Ramesh Babu (2009)⁸ explored the webometric study of 45 universities (both state and deemed) in Tamil Nadu. The study reflects that some universities in Tamil Nadu have higher number of web pages 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.

Ramesh Babu, Jeyshankar and Nageswara Rao (2010) Webometrics is concerned with measuring aspects of the web: websites, web pages, parts of web pages, words in web pages, etc. This study examines 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.

5. METHODOLOGY

The study obtained links of particular website by the use of following commands:

Domain: Extract the number of Web Pages at the website.

Linkdomain: Reveals the number of link Webpages linking to the website. It is called hyperlink pages.

Linkdomain: AND domain: It provides a complete report of number of Webpages which provides hyperlinks; it is called self-link pages (link from the same website).

Linkdomain: AND NOT domain:– It provides the report of number of pages not under the particular website. It is called external-link pages.

Linkdomain: NOT domain: Reveals the number of links incoming from other websites. It is called inlink pages.

The command 'domain' indicates the website address which plays an important role in this study, as it extracts the number of web pages of each websites. The studies of Webometrics make use of the Number of Webpages (NWP) as vital part in calculating WIF, so the same have been taken as Dependent variable and others like LWP, SLWP, ELWP and ILWP has been treated as independent variables. This study analyses the relationship of independent variables with dependent variable by Regression Analysis.

6. ANALYSIS AND DISCUSSION

6.1 Quantum of Web Pages of IIMs

The data are collected from the search engine Google because of its wide coverage and convenient use of Boolean Operators like AND, OR and NOT. Microsoft Excel and SPSS package are used for data analysis.

Table 2: Distribution of Webpages of IIMs in India

Sl.no.	Name Of the Institutes of IIMs	NWP	%	LWP	%	SLWP	%	ELWP	%	ILWP	%
1	IIM Calcutta (IIM-C)	85,500	19.30	15,800	4.66	98,300	23.46	88,700	19.25	13,800	4.33
2	IIM Ahmedabad (IIMA)	37,600	8.49	30,600	9.03	72,800	17.37	54,500	11.82	54,600	17.11
3	IIM Bangalore (IIMB)	67,000	15.13	14,900	4.40	44,400	10.60	33,600	7.29	33,800	10.59
4	IIM Lucknow (IIML)	19,000	4.29	18,000	5.31	20,000	4.77	80,600	17.49	29,000	9.09
5	IIM Kozhikode (IIMK)	37,000	8.35	95,800	28.26	24,000	5.73	36,000	7.81	19,000	5.95
6	IIM Indore (IIMI)	15,400	3.48	12,700	3.75	19,300	4.61	10,500	2.28	10,600	3.32
7	IIM Shillong (IIMS)	42,700	9.64	30,600	9.03	30,600	7.30	30,600	6.64	26,400	8.27
8	IIM Rohtak (IIM-R)	24,500	5.53	22,500	6.64	22,500	5.37	22,400	4.86	19,800	6.21
9	IIM Ranchi (IIM-R)	27,100	6.12	26,800	7.91	26,800	6.40	26,800	5.81	28,400	8.90
10	IIM Raipur (IIM-Rp)	22,300	5.03	18,200	5.37	20,500	4.89	8,770	1.90	16,200	5.08
11	IIM Tiruchirappalli (IIMT)	18,900	4.27	3,870	1.14	5,850	1.40	8,320	1.81	7,370	2.31
12	IIM Udaipur (IIMU)	32,400	7.32	34,000	10.03	18,800	4.49	45,000	9.76	46,000	14.42
13	IIM Kashipur (IIMkp)	13,500	3.05	15,200	4.48	15,200	3.63	15,100	3.28	14,100	4.42
	Total	442,900	100.00	338,970	100.00	419,050	100.00	460,890	100.00	319,070	100.00

Source: Google date: September 2012

DISCUSSION

NWP is the Number of Web Pages of IIMs in India. It is observed from the table that IIM Calcutta has been ranked first with (85500) 19.30% of total Number of Web Pages. The least number has been noted as (13500) 3.05% against IIM Kashipur.

LWP is the Link Web Pages of IIMs in India. It is witnessed from the table that IIM Kozhikode has been ranked first with (95800) 28.26% of total number of Link Web Pages. The least number has been noted as (3870) 1.14% against IIM Tiruchirappalli.

SLWP is the Self–Link Web Pages of IIMs in India. It is perceived from the table that IIM Calcutta has been ranked first with (98300) 23.46% of total number of Self–Link Web Pages. The minimum number has been noticed as (5850) 1.40% for IIM Tiruchirappalli.

ELWP is the External Link Web Pages of IIMs in India. It is explained from the table that IIM Calcutta has been ranked first with (88700) 19.25% of total number of External Link Web Pages. The minimum number has been noticed as (8320) 1.81% for IIM Tiruchirappalli.

ILWP is the In Link Web Pages of IIMs in India. It is enlightened from the table that IIM Ahmedabad has been ranked first with (54600) 17.11% of total number of In Link Web Pages. The minimum number has been noticed as (7370) 2.31% for IIM Tiruchirappalli.

6.2 Web Impact Factor (WIF)

The application of measuring Web Impact Factor was developed by Ingwersen (1998)¹⁰ for institutions under study at a specific time by search engine. It is the extent by which the site is linked and understood by other sites. 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)¹¹. 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 SelfLink 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, the ratio of links made incoming from other sites.

Table 3: Web Impact Factor of IIMs

Sl.no	Name of the Institute (IIMs)	NWP	LWP	SWIF	SLWP	SLWIF	ELWP	ELWIF	ILWP	RWIF
1	IIM Calcutta (IIM-C)	85,500	15,800	0.18	98,300	1.15	88,700	1.04	13,800	0.16
2	IIM Ahmedabad (IIMA)	37,600	30,600	0.81	72,800	1.94	54,500	1.45	54,600	1.45
3	IIM Bangalore (IIMB)	67,000	14,900	0.22	44,400	0.66	33,600	0.50	33,800	0.50
4	IIM Lucknow (IIML)	19,000	18,000	0.95	20,000	1.05	80,600	4.24	29,000	1.53
5	IIM Kozhikode (IIMK)	37,000	95,800	2.59	24,000	0.65	36,000	0.97	19,000	0.51
6	IIM Indore (IIMI)	15,400	12,700	0.82	19,300	1.25	10,500	0.68	10,600	0.69
7	IIM Shillong (IIMS)	42,700	30,600	0.72	30,600	0.72	30,600	0.72	26,400	0.62
8	IIM Rohtak (IIM-R)	24,500	22,500	0.92	22,500	0.92	22,400	0.91	19,800	0.81
9	IIM Ranchi (IIM-R)	27,100	26,800	0.99	26,800	0.99	26,800	0.99	28,400	1.05
10	IIM Raipur (IIM-Rp)	22,300	18,200	0.82	20,500	0.92	8,770	0.39	16,200	0.73
11	IIM Tiruchirappalli (IIMT)	18,900	3,870	0.20	5,850	0.31	8,320	0.44	7,370	0.39
12	IIM Udaipur (IIMU)	32,400	34,000	1.05	18,800	0.58	45,000	1.39	46,000	1.42
13	IIM Kashipur (IIMkpv)	13,500	15,200	1.13	15,200	1.13	15,100	1.12	14,100	1.04

DISCUSSION

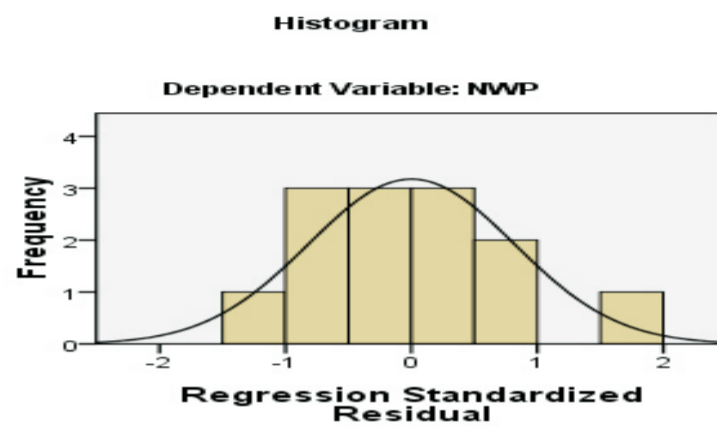
It is observed from the table that IIM Kozhikode has first place with 2.59% of SWIF. IIM Calcutta scored the minimum ratio which is 0.18%. It is seen that IIM Ahmedabad has high ratio of SLWIF i.e. 1.94% and the lowest is 0.31% for IIM Tiruchirappalli. ELWIF column has been shown that IIM Lucknow has the 4.24% as first and the least is 0.39% for IIM Raipur. The RWIF column shows that IIM Lucknow has the 1.53% as first and the least is 0.16% for IIM Calcutta.

6.3 Regression Analysis of Variance

Regression Analysis is a mathematical measure to the average relationship between two or more variables in terms of original units of the data. The relation between Number of Web Pages (dependent variable) and LWP, SLWP, ELWP & ILWP (independent variables) has been analyzed by using the method of Regression Analysis. Fitness of data can be studied by Histogram and Scatter Plot and the Line of Best Fit for the Regression Analysis.

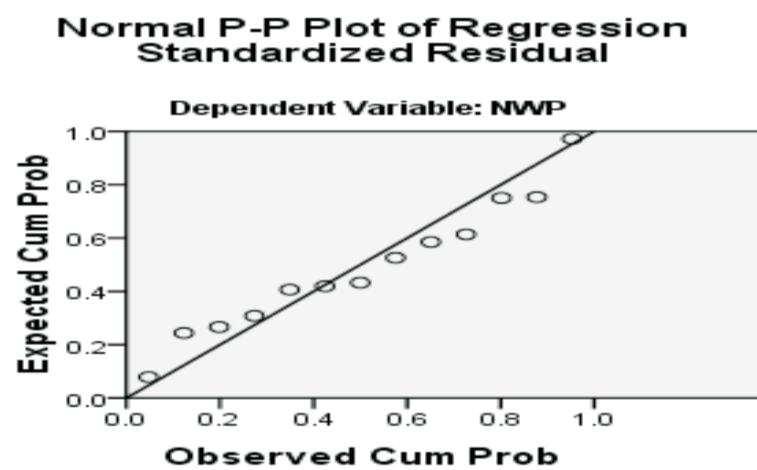
6.3.1 Histogram

In Histogram, a study about the normal curve shaped like a bell that peaks in the middle is expected and is said perfectly symmetrical of the data. Histogram with bell shaped curve shows our data has normality assumption which will enable the data to explore Regression Analysis.



6.3.2 Linear Expression of Web Pages

Fitness of variables can be tested by the Linear curve. The space between the line and Title scattered points explains how each independent variable is closed with the dependent variable. The following curve explains about nearness of each independent variable with dependent variable.



The figure shows the 13 IIMs' fitness as nearer to the linear line. Here each point represent a pair of X (independent variables such as LWP, SLWP, ELWP & ILWP) and Y (dependent variable such as NWP) values. Thus the data appear as scatter plot. This gives the spread of variables showing the nature of relationship.

6.3.3 Multiple Regression Analysis

The Websites with all its pages are entered into SPSS Package and the command for Regression Analysis has yield the following outcome and are interpreted according to the statistical rule.

6.3.3 (a) ANOVA^b (IIM)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3.709E9	4	9.273E8	4.561	.033 ^a
Residual	1.626E9	8	2.033E8		
Total	5.335E9	12			

a. Predictors: (Constant), ILWP, LWP, SLWP, ELWP
b. Dependent Variable: NWP

Sig is .033 means it is $>.01$ but $<.05$ specifies the 95% confidence in the ability of model to explain the dependent variable. So the decision about the F-test is statistically significant. In simple we can say that the probability of significant level is .33% only.

6.3.3 (b) Model Summary^b (IIM)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.834 ^a	.695	.543	14258.111

a. Predictors: (Constant), ILWP, LWP, SLWP, ELWP
b. Dependent Variable: NWP

The correlation coefficient (R) for the relationship between the independent variable and the dependent variable is 0.834, which can be characterized as a very strong relationship.

It is understood from the table 'Model Summary' that 69% of the variation has been explained.

The column R Square (between 0 and 1, a higher value is better) explains the proportion of deviation in the dependent variable by the regression model. It is understood that 69.5% of the variation has been explained. That is the independent variables together account for 69.5% of variation in the dependent variable – NWP.

6.3.3 (c) Coefficients^a (IIM)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	12356.773	9673.125		1.277	.237
LWP	.095	.187	.102	.510	.624
SLWP	.673	.220	.823	3.059	.016
ELWP	.040	.226	.049	.177	.864
ILWP	-.158	.324	-.104	-.487	.639

a. Dependent Variable: NWP

The significant column specified here given the untrustworthiness of variables which we analyzed. It is stated that the p-value (in the column "Sig.") must be low. (If $p < .05$, the independent variable is significantly related to the dependent variable) However the variable SLWP has .016 (which is below .1 so, 90% confidence of values) specifies only a little level compared with all other variables.

The digits .237 indicates that the dependent variable is unreliable for 23%

The significant level of the variable SLWP is .016 (is $<.1$) has the lowest level of unreliability among all.

It is known from the column B of Unstandardized coefficients (In the column 'Unstandardized Coefficient' (B) explains the direction of the relationship between independent variable and the dependent variable):- One unit increase of Number of Web page (NWP) is due to

The contribution made by LWP is 9%

The contribution made by SLWP is 67%

The contribution made by ELWP is 4% and

The contribution made by ILWP is 15% inverse way.

The independent variable Self Link Webpages (SLWP) contributes more to the independent variable Number of Web pages (NWP) amongst all links of IIMs.

7. MAJOR FINDINGS AND OBSERVATIONS

7.1. Distribution of Webpages of IIMs in India

IIM Calcutta has been ranked with first in NWP among all IIMs with 19.30% of total Number of Web Pages.

IIM Kozhikode has been ranked first with 28.26% of total number of Link Web Pages.

IIM Calcutta has been ranked first with 23.46% of total number of Self – Link Web Pages.

IIM Calcutta has been ranked first with 19.25% of total number of External Link Web Pages.
IIM Ahmedabad has been ranked first with 17.11% of total number of In Link Web Pages.
It is revealed from the table that IIM Tiruchirappalli secured lowest in all web pages except the Number of Web Pages (NWP) in which IIM Kashipur has been noted with least Number of Web Pages.

7.2. Web Impact Factor of IIMs

While calculating SWIF, IIM Kozhikode has first place with 2.59% and IIM Calcutta scored the minimum ratio which is 0.18%.

In SLWIF, IIM Ahmedabad has high ratio of i.e. 1.94% and the lowest is 0.31% for IIM Tiruchirappalli.
The calculation of ELWIF, we have IIM Lucknow has the 4.24% as first and the least is 0.39% for IIM Raipur.
The RWIF shows that IIM Lucknow has the 1.53% as first and the least is 0.16% for IIM Calcutta.

7.3. Regression Analysis of Variance

The data has normality assumption when tested with Histogram and the Line of Best Fit thus paved the way for Regression Analysis.

ANOVA table explains about the model as a whole is significant. Our data shows the NWP is explained with 95% by the independent variables. The probability of insignificant level is .33% only.

It is shown that the relationship between independent variables (LWP, SLWP, ELWP & ILWP) with the dependent variable (NWP) is strongly existed.

The independent variables together account for 69.5% of variation in the dependent variable – NWP.

The Coefficients of IIM states about the significant (if it is below .05, it is good) as untrustworthiness. The dependent variable NWP is reliable only for 23%. The NWP is increased its one unit by the contributions made of LWP 9%, SLWP 67%, ELWP 4% and ILWP 15% (inversely).

The overall Regression Model shows that the contribution by Self Link is more amongst all other links to Number of Web pages.

8. CONCLUSION

As we do not know the knowledge of the algorithms used by search engine to extracts the web pages when we gave the syntax with the Boolean operators which specify some meaning, the semantics may play vital role in the retrieval of number of web pages. The use of metadata by websites and electronic journals would be expected to be the higher than the norm. To some extent metadata acts as filter; so that material that is worth retrieving will have metadata added, while more transitory material will not have metadata attached. The diversity of people creating web documents and links of course affects the quality and reliability of these web elements.

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APPENDIX
List of IIMs and their URLs

Sl. No	Name Of the IIMs	Year of Establishment	URL
1	Indian Institute of Management, Calcutta (IIM-C)	1961	www.iimcal.ac.in
2	Indian Institute of Management, Ahmedabad (IIMA)	1961	www.iimahd.ernet.in
3	Indian Institute of Management, Bangalore (IIMB)	1973	www.iimb.ernet.in
4	Indian Institute of Management, Lucknow (IIML)	1984	www.iiml.ac.in
5	Indian Institute of Management, Kozhikode (IIMK)	1996	www.iimk.ac.in
6	Indian Institute of Management, Indore (IIMI)	1996	www.iimidr.ac.in
7	Indian Institute of Management, Shillong (IIMS)	2007	www.iimshillong.in
8	Indian Institute of Management, Rohtak (IIM-R)	2010	www.iimrohtak.ac.in
9	Indian Institute of Management, Ranchi (IIM-R)	2010	www.iimranchi.ac.in
10	Indian Institute of Management, Raipur (IIM-Rp)	2010	www.iimraipur.ac.in
11	Indian Institute of Management, Trichy (IIMT)	2011	www.iimtrichy.ac.in
12	Indian Institute of Management Udaipur (IIMU)	2011	www.iimu.ac.in
13	Indian Institute of Management, Kashipur (IIMkp)	2011	www.iimkashipur.ac.in