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Informetric Analysis of Web 2.0 Literature

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Describes an informetric study on web 2.0 tools based on publication counts in 29 LIS journals from Emerald database. A total of 1,280 published items were retrieved; the top productive journals in the field of web 2.0 are identified; journals are listed along with the number of citations provided and the ranks they hold; degree of collaboration in different year is calculated; distribution of citations according to bibliographic forms; authorship pattern; geographic scattering of citations, distribution of citations by Indian and Foreign authors are studied.

Keywords: Informetrics, Bibliometrics, Web 2.0.

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INTRODUCTION

Informetric techniques have been gaining importance and recognisation in their application. The term informetrics investigate quantitative aspects of information process particularly, those using text. It is the quantitative arm of library and information science. It incorporates the older field of bibliometrics and the new areas of cybermetrics and webometrics, where scientometrics investigate quantitative aspects of science, scientific communication studies. Scientometrics and informetrics are bound through their mutual interest in scientific literature (Roa and Meera, 1991).

Smith (1981) provides a detailed description of the application of informetrics, specifically citations count and analysis in LIS. He observes that there are two themes constantly reflected in the use of citation analysis. i.e., the use of citations as tools for the librarian, and the use of citations as tools to analyze research activity. The informetric research is much wider than most and integrates all presently existing orientations, such as applications to science policy, library science, and information retrieval.

The use of literature of a particular discipline reaches a maximum after a certain period of time from their date of publication and there its use gradually decreases. Many scientists have tried to measure the relationship between the time (age of the literature) and the amount of the literature that cease to be used. It is the period of time during which half of currently cited literature is published (Musib, 1986). Keeping this in mind a measure of web 2.0 literature in different areas of Library and Information

science has been attempted through informetric analysis. Informetric is the innovative, inter–disciplinary research on new methods to solve problems related to real world data. It develops new methods and new ideas for understanding unobserved structures from observed noisy end limited data.

REVIEW OF LITERATURE

Wolfram (2000) presented the applications of informetric study of information retrieval systems for more efficient and effective design and evaluation of information retrieval systems. Era (2002) summarized and discussed the productivity of authors, or in articles, words, or phrases in scientific patterns using informetric methodologies. Lafouge (2006) pointed out that statistical distribution in production of information is most often studied in the framework of Lotkanian informetrics. In this paper, the author recall some results of basic theory of Lotkaian informetrics, then he transpose methods applied to Lotkanian distributions by Leo Egghe to the exponential distributions. The author gives examples and compares the results. Finally, he proposed to widen the concept of exponential informetric process. Sudhier (2009) analyzed 3,796 references collected from 12 Physics doctoral dissertations of the University of Kerala. Results indicate that collaborative research is preferred rather than solo research.

OBJECTIVES OF THE STUDY

The main objectives framed for this study are;

- To find out the number of cited documents and the average number of references per article.
- To identify and analyze the rate of web 2.0 literature using informetrics.
- To analyze the authorship patterns and to examine the extent of research collaboration.
- To identify the source wise distribution of the publications.
- To identify the highly cited papers in the field of web 2.0.
- To examine the degree of author collaboration in web 2.0 literature.

SCOPE AND LIMITATIONS OF THE STUDY

The study is limited to the field of web 2.0 technologies. The data is collected from Emerald database which covers 29 LIS journals accessed through Kuvempu University Library Portal. Only certain aspects depicting research trends like growth of literature, authorship pattern, and document wise distribution have been covered in this study.

METHODOLOGY

The study used informetric analysis for studying the literature on web 2.0 tools available in the Emerald database during the period 2007-2011. The bibliographical details of each issue of the journal articles were downloaded from the Emerald database available through Kuvempu University Library Portal. All the required bibliographical data such as name of the author(s), title, source of documents, year of publication and article type were collected and recorded. The collected data has been tabulated in order to obtain results in respect of the stated objectives.

ANALYSIS AND RESULTS

Various statistical techniques are used for analysis to make the data more meaningful. The analyzed data has been presented in the following sections.

Research Productivity

Growth of a field can be identified by looking at the yearly distribution of the papers in a given field. It is interesting to observe the initial growth in the field of web 2.0 literature. From the following table we can find out the growth rate of web 2.0 literature from 2007 to 2011.

It is found from the Table 1 that the growth rate in the year 2007 is 35 (0.02%) and followed by 230 (0.18%) in the year 2008. Similarly the growth rate in the year 2009 is 373 (0.29%), in the year 2010 the growth rate is 370 (0.28%), and in the year 2011, the growth rate is 272 (0.21%). From the Table 1 we come to know that, the number of citations and the growth rate is high in the year 2009. (see Figure 1)

Distribution of Citations according to bibliographic forms

The literature in any discipline is published in different bibliographic forms such as journals, books, seminars/conference proceedings, reports, thesis and dissertations, patents, news papers and web resources. Table 2 clearly shows that the distribution of citations among different forms in web 2.0 literature.

The table 2 contains an analysis of different categories of documents cited by all 1280 articles. Out of 1280 citations, 551 (43.04%) are from journals. This strengthens the universal belief, concerning literature use

Table 1: Research Productivity Trend

Year	No. of Citations	Growth Rate (%)
2007	35	0.02%
2008	230	0.18%
2009	373	0.29%
2010	370	0.28%
2011	272	0.21%
	Total = 1280	100%

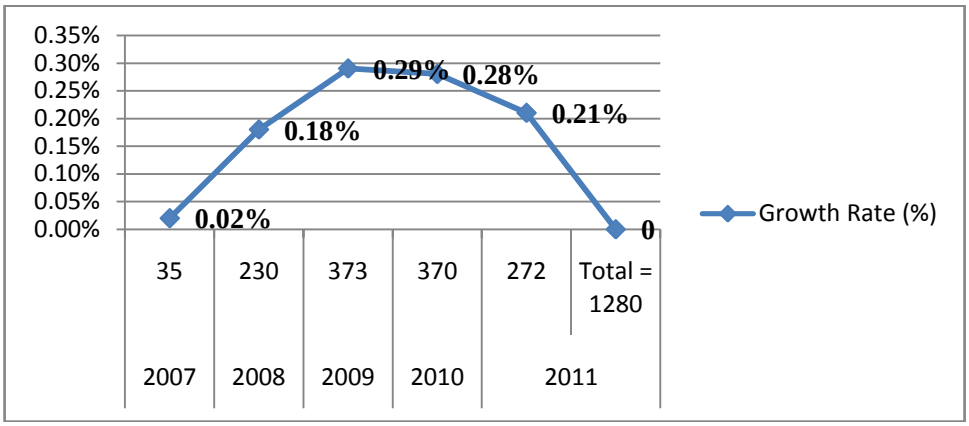

Figure 1: Research Productivity Trend

Table 2: Distribution of citations according to bibliographic forms

Bibliographic Forms	No. of Citations					Total	Percentage (%)
	2007	2008	2009	2010	2011		
Journals	4	82	146	193	126	551	43.04%
Books	2	58	93	110	57	320	25.0%
Conference Papers	0	36	46	25	18	125	9.76%
E-books	5	1	1	7	18	32	2.50%
Handbooks	1	0	1	0	1	3	0.23%
URL	23	49	80	39	58	249	19.45%
						Total=1280	100%

habits of authors, that, the most frequently used sources of information are periodicals. The second major source of information is books, accounting for 320(25.0%) of total citations. In other words journals and books together meet 67.94% of information needs. The remaining information source such as conference papers (9.76%), e-books (2.50%), hand books (0.23%) and URL (19.45%) have met the information requirements of the authors.(See Figure 2)

Authorship Pattern

One of the main objectives of the present study is to identify the number of articles contributed by authors in the field of web 2.0 tools. The study of authorship patterns helps to assess the all contributions of the authors.

Table 3 reveals the overall authorship trend in the field of web 2.0. It shows the total contributions of single authors and multi-authors. Analysis shows that majority of the papers are single authored 730 (56.88%) followed by two authors and three authors which accounts 320 (24.90%) and 150 (11.67%) respectively. Remaining 50 (3.89%) and 18 (1.40%) are written by four and five authors. Other 16 (1.24%) papers are written by more than five authors. During the study, it was observed that single authorship was norm in cited resources. (see Figure 3)

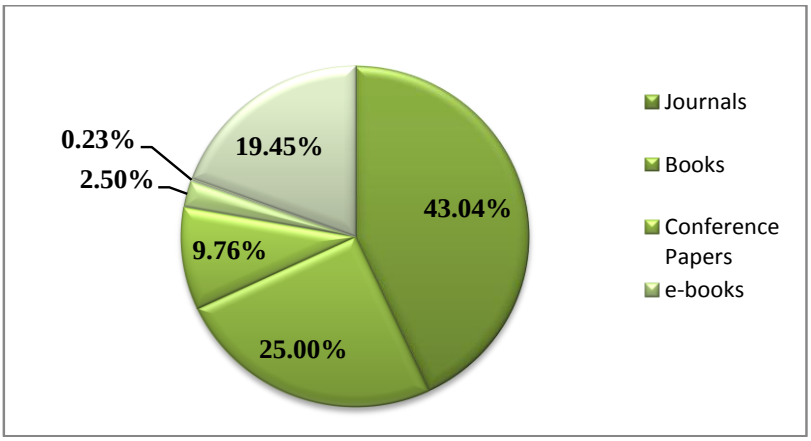

Figure 2: Distribution of Citations according to Bibliographic Forms

Table 3: Authorship Pattern

No. of Authors	No. of Citations					Total	Percentage (%)
	2007	2008	2009	2010	2011		
One	30	139	219	192	157	730	56.88%
Two	4	54	84	107	71	320	24.90%
Three	1	22	38	62	27	150	11.67%
Four	0	13	20	10	7	50	3.89%
Five	0	3	6	0	4	13	1.40%
Five and above	0	5	3	2	6	16	1.24%
						Total=1280	100%

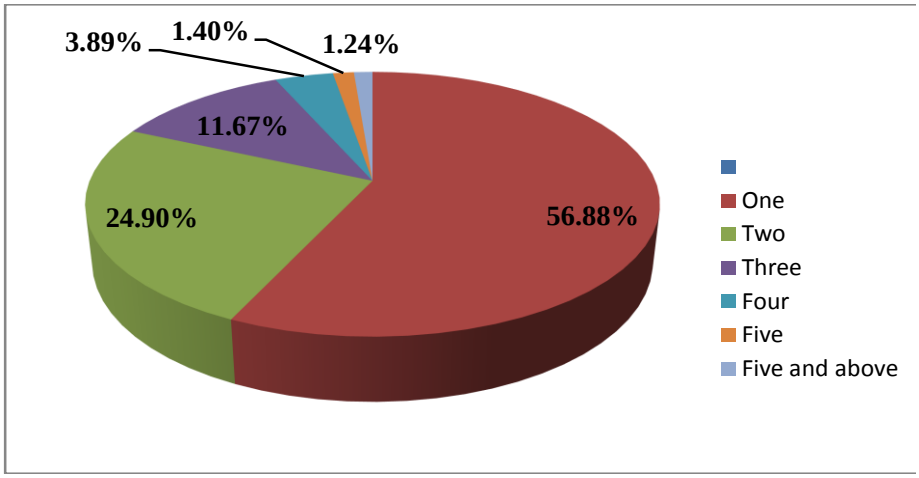

Figure 3: Authorship Pattern

Geographic Scattering of Citations

Researchers in informetric studies are interested to find the countries which are contributing the most in given field. This type of analysis also helps to identify the countries which have taken up the research work in given field.

The table 4 illustrates geographic distribution of

Table 4: Geographic Scattering of Citations

Sl. No	Location	No. of Citations					Total	Percentage (%)
		2007	2008	2009	2010	2011		
1	New York	2	10	26	13	12	63	32.47%
2	India	0	0	0	0	3	3	1.54%
3	London	0	6	19	7	4	35	18.04%
4	Chicago	0	0	0	2	2	4	2.06%
5	Canberra	0	0	0	1	1	2	1.03%
6	Pittsburgh	0	0	1	1	0	2	1.03%
7	Boston	1	2	2	4	4	13	6.70%
8	Vancouver	4	0	0	0	5	9	4.63%
9	Washington	0	0	2	8	0	10	5.15%
10	Spain	0	0	0	1	0	1	0.51%
11	Berlin	0	4	3	4	2	13	6.70%
12	Cambridge	0	4	2	4	3	13	6.70%
13	Singapore	0	0	0	0	2	2	1.03%
14	China	0	0	0	0	0	3	1.54%
15	Germany	0	3	0	0	0	2	1.03%
16	Japan	0	2	0	0	0	2	1.03%
17	Amsterdam	0	2	0	0	0	1	0.51%
18	SanFrancisco	0	1	1	4	2	7	3.60%
19	Beijing	0	0	0	0	0	1	0.51%
20	Medford	0	1	1	0	4	8	4.12%

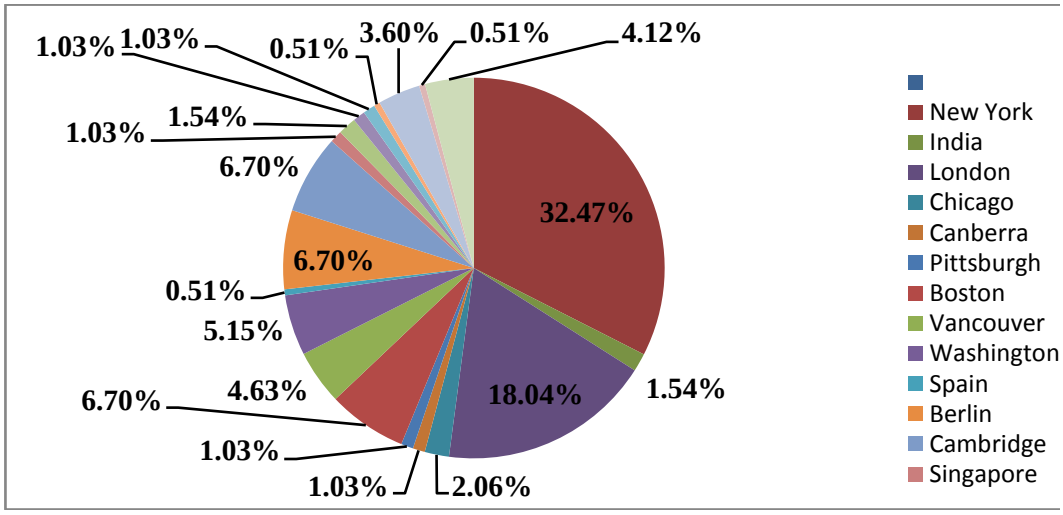

Figure 4: Geographic Scattering of Citations

documents. In this study authors are analyzed according to their country/state of origin. Out of 194 articles, majority of contributions are from New York 63 (32.47%), London 35 (18.04%) and Boston, Berlin and Cambridge 13 (6.70%). Followed by Washington 10 (5.15%), Vancouver 9 (4.63%), Medford 8 (4.12%), San Francisco 7 (3.60%), Chicago 4 (2.06%) Amsterdam, China and India 3 (1.54%). Remaining contributions are from Canberra, Germany, Singapore and Japan authors contributed 2(0.03%) contributions. Other countries like Spain, Berlin, and Beijing authors contributed 1 (0.51%) papers. It is observed from this study that majority of contributions 0.98% is from foreign authors. (see Figure 4)

Distribution of Citations by Indian and Foreign authors

An attempt has been made in this study to analyze the documents by Indian and Foreign authors.

Table 5: Distribution of Citations by Indian and Foreign authors

Year	No. of records		Percentage (%)	
	Indian Authors	Foreign Authors	Indian Authors	Foreign Authors
2007	0	35	0%	1.52%
2008	2	416	5.88%	19.88%
2009	3	635	8.82%	30.35%
2010	21	577	61.76%	27.58%
2011	8	429	23.52%	20.50%
	Total= 34	**Total= 2092**	**100%**	**100%**

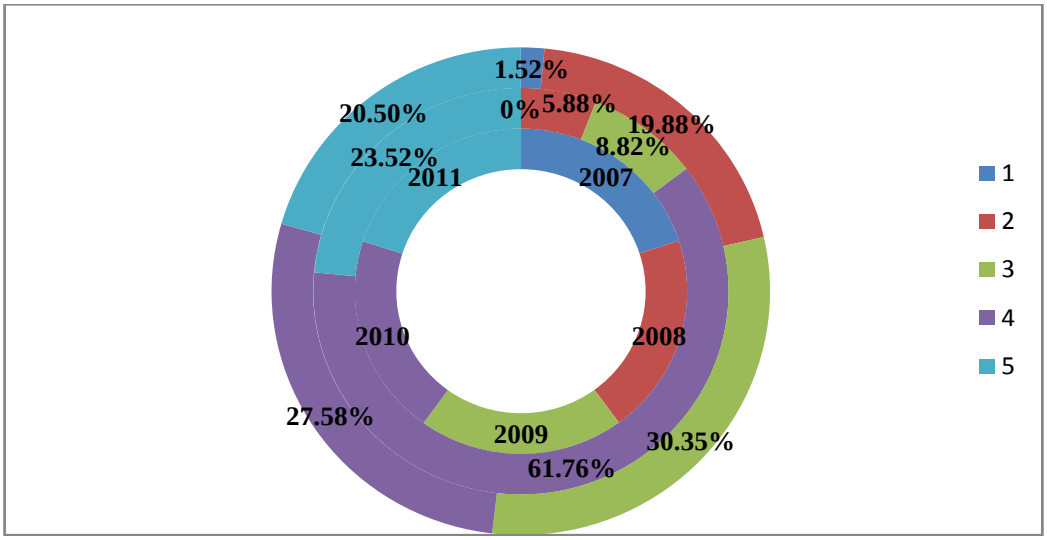

Figure 5: Distribution of Citations by Indian and Foreign authors

The Table 5 illustrates the distribution of records by Indian and Foreign authors. It is found that in the year 2007, the contribution of Indian authors is 0 (0%) and foreign authors is 35 (1.52%). It is followed in the year 2008, the contribution of Indian authors is 2 (5.88%) and Foreign authors is 416 (19.88%), in the year 2009 the contribution of Indian authors is 3 (8.82%) and Foreign authors is 635 (30.35%), in the 2010 the Indian author's contribution is 21 (61.76%) and Foreign authors is 577 (27.58%), and in the year 2011, Indian authors contributed 8 (23.52%) and foreign authors contributed 429 (20.50%) citations. From this study, we may observe that the majority of contributions (0.46%) are made by foreign authors. (See Figure 5)

Most cited works

Researcher may refer the same article many times written by the same author. This leads to identify the most cited works of the authors. The following table clearly shows the total number of citations more cited by the authors.

It is evident from this study that (Table 6), majority 16 (34.04%) contributors have been cited the works of the author Alimohammadi, D., followed by 8 (17.02%) contributors cited the works of Stephens, M., 6 (12.76%) contributors citations referred of VPL, 5 (10.63%) contributors referred of Marton, F. Further the table 6 indicates that the authors Cress, U., Razmerita, L. and Hinchcliffe, D., have equally cited by the contributors i.e., 4 (8.51%). (See Figure 6)

Degree of Author Collaboration

In recent years, most countries have realized the importance of scientific research for its socio-economic development, and have initialized programmes that encourage and support collaboration among scientists and researchers, both at national and international level. In order to measure the collaborative research pattern, an indicator known as degree of collaboration proposed by Subramanyam (1983) is used.

To determine the degree of collaboration in web 2.0 literature, the following formula given by 'Subramanyam' has been used in the table 8.

Table 6: Most cited works

Author Name	No. of Citations	Percentage (%)
Alimohammadi, D	16	34.04%
Stephens, M	8	17.02%
VPL	6	12.76%
Marton, F	5	10.63%
Cress, U	4	8.51%
Razmerita, L	4	8.51%
Hinchcliffe, D	4	8.51%
	Total= 47	**100%**

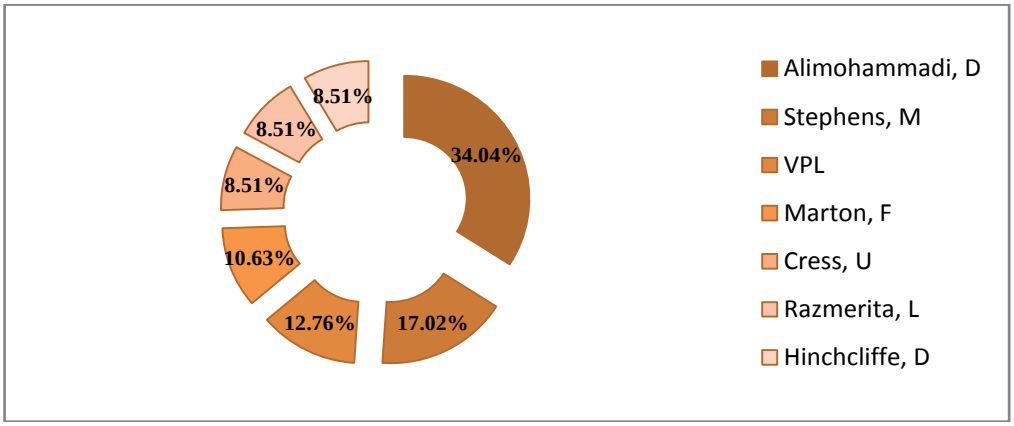

Figure 6: Most cited works

Table 7: Degree of Author Collaboration

Year	Single Authors	Percentage (%)	Multi Authors	Percentage (%)	Total no. of Citations	Degree of Collaboration
2007	30	4%	5	0.90%	35	0.00%
2008	139	18%	97	17%	236	0.18%
2009	219	29%	151	27%	370	0.28%
2010	192	26%	186	33%	378	0.29%
2011	157	21%	115	20%	272	0.21%
	Total= 737	**98%**	**Total= 554**	**97.9%**	**1291**	**Mean= 0.96%**

$$C=N_m/ (N_m+N_s)$$

Where,

C= Degree of collaboration

N_m= Number of multi-authored papers

N_s= Number of single-authored papers.

Therefore, in this present study the value of C is:

C=554/ (554+737)

C=0.4291

The single versus multi-authored papers also seen in the table 7 with their percentage of contributions. During the period of study the share of multi-authored papers are around 43%. The study also reveals that the majority of the articles in web 2.0 literature are single authored papers.

The degree of collaboration in different year is calculated as per the equation proposed by Subramanyam. The degree of collaboration in the year 2005 to 2011 is calculated and it varies from 0.0033% to 0.2106%. The mean value is found to be 0.96%. (See Figure 7)

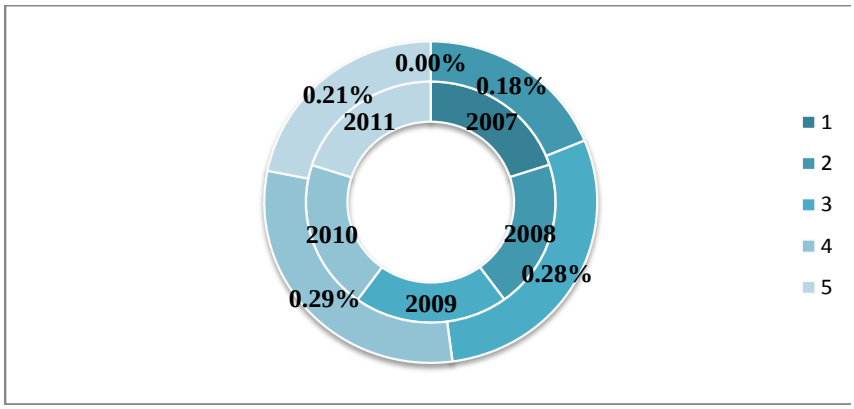

Figure 7: Degree of Author Collaboration

Table 8: Web References

Year	Total No. of articles	Total No. of articles with web references	Total No. of articles with printed references	Percentage	
				Web references	Printed references
2007	1	23	12	9.23%	1.16%
2008	10	49	181	19.67%	17.52%
2009	13	80	287	32.12%	27.78%
2010	11	39	338	15.66%	32.72%
2011	9	58	215	23.29%	20.81%
	Total=44	**Total=249**	**Total=1033**	**100%**	**100%**

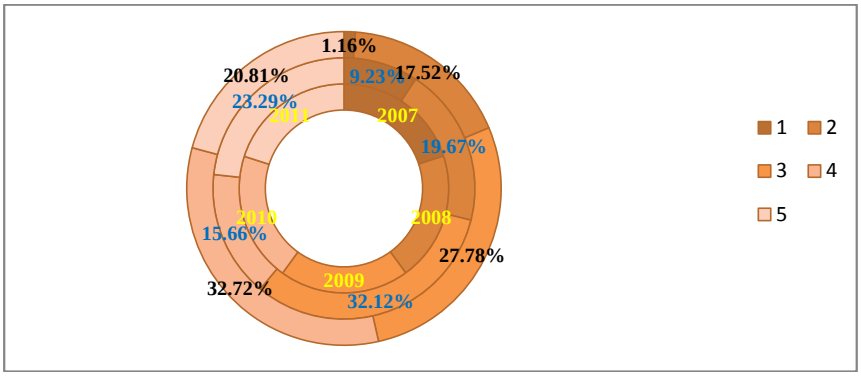

Figure 8: Web References

Web References

An attempt has been made in this study to analyze web and printed references cited by the authors in web 2.0 literature. The analyzed data has been represented in the following table 8.

The table 8 represents the number of web references and printed references used by the contributors. It is observed from the above table that, among the total 1280 citations, 23 (9.23%) are web references and 12 (1.61%) are printed references in the year 2007, followed by 49 (19.67%) are web references and 181 (17.52%) are printed references in the year 2008, 80 (32.12%) of web references and 287 (27.78%) of printed references are found the year 2009, 39 (15.66%) of web references and 338 (32.72%) of printed references are found in the year 2010 and 58 (23.29%) and 215 (20.81%) of web and printed references are found in the year 2011. It can be revealed from this study that 80.57% of authors referred the printed resources than the web resources. (See Figure 8)

SUMMARY OF FINDINGS

The major findings of the study are as follows:

- The total number of citations found on web 2.0 literature in Emerald databases are 1304 during the year 2007-2011.
- Highest number of citations 380 (0.29%) papers in the year 2010, followed by the year 2009.
- Decreasing growth rate is found in the year 2011 (0.21%) when compared with the previous year 2010 (0.29%).
- Journals records the highest number of citations i.e. 551 (43.04%) papers when compared to other forms.
- Authorship pattern of contributions shows that significant number of articles has single authored papers i.e. 730 (56.88%). This is followed by 320 (24.90%) papers with two authored.
- New York takes first place with 63 (32.47%) articles followed by London which takes second place with 35 (18.04%) articles.
- The highest number of articles published by foreign authors i.e. 635 (0.08%) when compared with the Indian authors.
- The Indian author publications are found to be very few i.e. the study found only 34 citations compared to foreign authors with 2092 citations.
- In the most cited works, majority of authors have cited the works of the author Alimohammadi, D. with 16 (34.04%) citations.
- In the degree of collaboration, the year 2010 has presented the highest number with 378 (0.29%) citations.
- The degree of collaboration found from the study is 0.4291%.
- Of the total 1282 citations, majority of the citations are printed references i.e. 1033 (80.57%).
- The degree of collaboration is varies from 0.0033% to 0.2106%.
- The mean authorship is found to be 0.96%.

CONCLUSION

Research trend in LIS is collaborative in nature like any other discipline. Bibliometric/informetric studies are concentrated on data drawn from databases, individual journals, individual institutions, research output in a particular field of knowledge, individual subject output, individual author publications, and so on. The present study analyzed various factors like authorship pattern, source wise distribution of the publications, highly cited papers in the field of web 2.0, degree of author collaboration and so on. The study found that the web 2.0 studies are not distributed equally among the nations. The Indian author publications are found to be very few. Indian authors should be given more publications in the subject field which lag behind. This in turn facilitates the production of more research in the country. Further studies are required to be done in the area of co-authorship and bibliographic coupling of web 2.0 literature at national and international level.

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