

Growth and Development of Literature in the field of Web 2.0: A Bibliometric Study

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Abstract

This paper uses SCOPUS as the citation data source, and uses 'Web2.0' as the key word to search the research papers related to Web2.0 during the period of 2004- 2012 . A total of 1651 citation were retrieved having key word web2.0" in the title of the document. All citations are then exported to MS-Excel sheet for analysis. Each citation was analyzed to ascertain the various bibliographical forms of the document like books, periodicals, conference proceedings, workshop, theses etc. Other bibliometric aspects of study like authorship pattern, ranking of journals, chronological distribution, Authors Ranking, geographical scattering are studied. Results revealed that literature in the field of Web2.0 is growing continuously and US and UK are the most dominant contributors over other countries in publishing papers on web2.0. Further, the research found that "journal articles" are primary medium of communication among the researchers in the field of Web2.0

Keywords: Web2.0; Bibliometric analysis; Literature growth; Scopus; Collaboration.

Introduction

Web 2.0 is a buzzword introduced in 2004, first coined by Dale Dougherty (O'Reilly, 2005, in Anderson, 2007) is a second generation of World Wide Web. Web 2.0 technologies are collectively a tool for bringing together the contributions of millions of peoples and making them matter. Some important Web 2.0 tools are blogs, wiki, social networking, book-marking, web application, podcasts and RSS. The development of Web 2.0 tools and techniques has drawn attention of cross-sections of communities including computer professionals, library professional, educationists, business and many more. The trend of research in Web 2.0 has boosted the growth of literature of this subject from the

inception as because of its multi-disciplinary applications and research interest. So it is highly significant to find out publication growth pattern of Web2.0 literature. In the present study the investigators have made an attempt to shed some light on the real significance of literature growth trends, by analyzing number of publication, year wise growth of publication, discipline wise growth of publication etc.

Research publications are the epithet of intellectual discoveries primarily aiming to transmit new ideas or information for bringing advancement in knowledge and applying in all areas. With this background, the study aims to make an assessment of the research work carried out in the above areas retrospectively only for those work which have been indexed in Scopus.

Review of Literature

In the recent times bibliometric techniques are increasingly used for the assessment of pattern of literature growth in a particular field. The trend of research in Web 2.0 has boosted the growth of literature of this subject

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from the inception as because of its multi-disciplinary applications and research interest. So it is highly significant to find out publication growth pattern of Web2.0 literature by analyzing number of publication, year wise growth of publication, discipline wise growth of publication etc. A good amount of literature on bibliometric analysis of particular field of study is available. A few of such research have been reviewed as under;

Falagas *et al* (2006) studied on "A bibliometric analysis of research productivity in Parasitology by different world regions during a 9-year period (1995-2003)". By Using the PubMed database they retrieved articles on "Parasitology" and analyzed the research productivity. The research productivity was also evaluated in relation to gross domestic product of each region and in relation to gross national income per capita and population of each region. Results suggest that more help should be provided by the developed nations to developing areas for improvement of the infrastructure of research.

Harande (2011), in his study on "Exploring the literature of diabetes in Nigeria: a bibliometrics study", examines the increasing diabetes-related literature in Nigeria, using a bibliometric approach. The National Library of Medicine PubMed was used as the database for this exercise. A bibliometrics technique and Bradford-Zipf distribution were utilised. A list of periodical articles on diabetes in Nigeria published during 1966-2009 was compiled for the study. A total of 512 articles were identified. These articles were published in 57 journals. The 4-yearly distribution of literature indicated clearly that there was a rapid growth of the literature from the year 1986 onwards. The findings indicate that the literature of diabetes in Nigeria is in harmony with the Bradford-Zipf distribution.

A study conducted by Maharana *et al*, (2006) on " Scholarly use of web resources in LIS research: a citation analysis. In india The essential purpose of this paper is to measure the amount of web resources used for scholarly contributions in the area of library and information science (LIS). The study

revealed that 292 (34.88 per cent) out of 837 were web citations, proving a significant correlation between the use of Internet resources and research productivity of LIS professionals in India. The highest number of web citations (35.6 per cent) was from .edu/.ac type domains. Most of the web resources (46.9 per cent) cited in the study was hypertext markup language (HTML) files. , the result of analysis of 292 web citations spread over 95 scholarly papers published in the proceedings of the India (SIS-2005) has been reported.

Tsay, (2000) in his study entitled "Semiconductor is the key element for information industry", investigated the growth of semiconductor literature based on the database of INSPEC. Bibliometric techniques, such as Bradford-Zipf's plot and Lotka's law have been employed to further explore the characteristics of semiconductor literature. Quantitative results on the literature growth, form of publication, research treatment, publishing country and language, author productivity and affiliate are reported. Moreover, from the Bradford-Zapf's plot, 25 core journals in semiconductor were identified and analyzed. After the year 1986, the literature grows approximately linearly with a growth rate of about 23000 items per year.

Arya and Sharma (2011). In their study entitled "Authorship trends and collaborative research in veterinary sciences: A bibliometric study" discussed about the collaboration in research and authorship trends in the area of veterinary sciences all over the world with special reference to India. For the present study the research data were collected from 'CAB abstracts' for the period of 2006-2010. The findings of the study revealed that collaborative research has been preferred by the scientists over that of solitary research. Average degree of collaboration was found 0.84; it also indicates dominance of collaborative research over solo research. Subject analysis revealed a good research in the area of animal nutrition and veterinary physiology.

Patra *et al*, (2006) in their study entitled "Bibliometric Study of Literature on

Bibliometrics" clearly spelt out the growth pattern, core journals and authors' distribution in the field of bibliometrics using data from Library And Information Science Abstracts (LISA). Growth of literature does not show any definite pattern, the study observed. The authors have used Bradford's law of scattering to identify the core journals and identified 'Scientometrics' as the core journals in this field. The study also used Lotka's law to identify authors' productivity patterns. The study further observed that, authors' distributions do not follow the original Lotka's law and identified 12 most productive authors with more than 20 publications in the field.

Objectives

This study attempts to provide a more detailed account of the productivity trend and publication behaviour of Web2.0 Researchers. The basic purpose of the study is to measure the contribution of researchers to the field of web 2.0.

Besides, the study is primarily aims at the following objectives:

- i. To trace the trends of research in the field
- ii. To identify the most popular bibliographical forms of documents in the field of web 2.0
- iii. To recognize Authorship pattern of publications
- iv. To map the chronological growth of literature
- v. To identify the countries which are significant in producing literature in the concerned field.
- vi. To identify Discipline wise growth of publication of Web2.0.

Methodology

In this research the key word "Web2.0" has been taken as search term to search the Scopus database. Search approach is limited to the

appearance of the keyword in the title of the publication and the time range of published literature is 2004 to 2012. Scopus has been selected for retrieving the publication lists as it is a largest abstract and citation database of research literature, which indexes several types of publications such as research papers, reviews, short notes, and editorial as appearing in journals, articles appearing in conference/ seminar proceedings In this research all types of publications as indexed in Scopus have been included for analysis.

A total of 1651 citation were retrieved having key word "web2.0" in the title of the document. All citations are then exported to MS-Excel sheet for analysis. Each citation was analyzed to ascertain the various bibliographical forms of the document like books, periodicals, conference proceedings, workshop, theses etc. Other aspects of study like authorship pattern, ranking of journals, chronological distribution, Authors Ranking, geographical scattering are studied after determining the various forms of documents. Like any bibliometric analysis of published literature, the present study is also based on the quantitative measures rather than the quality of the content of documents.

Scope and Limitation

Before making any progress in social science research, it is highly essential to determine its scope and limitations. This will be helpful for timely completion of the research. The present investigation confined its scope to the literature growth study of publications of web 2.0, indexed in the Scopus database from 2004 to 2012. The study will basically investigate authorship pattern of publication, year wise growth of publication, discipline wise productivity, geographical scattering etc. However, the present study has been characterized with the following limitations:

- ◆ It includes literature growth study of publications of web 2.0, indexed only in the Scopus database from 2004 to 2012. (Limitation by source database)

Table 6.1

Authorship Pattern	No. of Contribution (n=1651)	Percentage
Single Author	561	33.97
Two Authors	434	26.3
Three Authors	329	19.92
Four Authors	181	10.96
Five Authors	78	4.72
More than five and less than ten Authors	60	3.63
Ten and more Authors	8	0.5

- ◆ It includes only publications having the key word "Web2.0" in the title of the document. There might be other publications on the topic Web2.0 without having the word "Web2.0" in the title of the publication. (Limitations by title of publications)

Data Analysis and Discussion

Authorship pattern of whole contribution

Authorship pattern discloses how the papers are distributed among the authors, authors collaboration etc. Authorship pattern is one of the very important Bibliometric indicators in order to assess the degree of collaboration of the authors in a particular discipline or in institution.

Table 6.1 and Graph 6.1 indicate that the highest 561(33.97%) number of articles have single authors followed by 434(26.3%) with

two authors, 329 (19.92%) and 181(10.96%) have three and four and authors respectively. While 78 (4.72%) articles are five authored, 60 (3.63%) articles are authored by more than five and less than ten authors. Only 8 (0.5%) articles are authored by ten and more authors. Data relating to authorship pattern as above is evident that, out of 1651 publication only 561 number of publication is single authored and remaining 1090 publications are co-authored. Hence it is evident that authors of Web2.0 have a tendency to work in collaboration with other researchers usually in a team of 2 to 4 researchers. However, collaboration with more than five authors has produced very insignificant number of papers.

Year-wise growth of publications

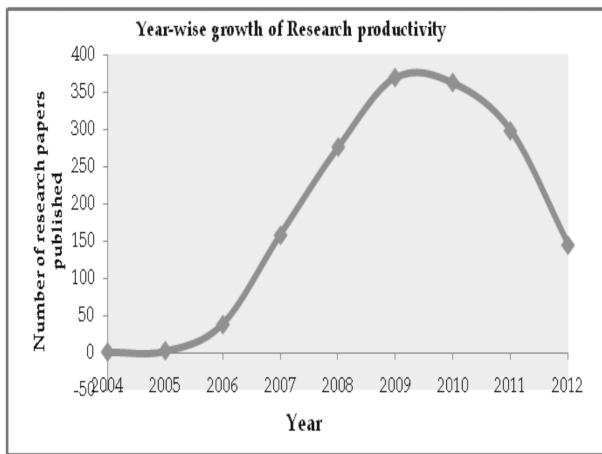
Study of Year wise Growth of publication is one of the very important Bibliometric indicators in order to assess the degree of growth of publication and to find out the most

Graph 6.1

Table 6.2: Year-wise Growth of Research Publications

Year	Number of Research Papers published	%
2004	1	0.32
2005	2	0.58
2006	38	2
2007	158	10
2008	276	17
2009	370	22
2010	363	21.10
2011	298	18
2012	145	9
Total	1651	100

Graph 6.2



Graph 6.2 presents the year-wise growth of research productivity during 2004-2012. The year 2004 is the year of inception of the concept "Web2.0", lowest number of paper that is only 1 paper is published as reflected in the Scopus database. Is the remaining years as shown in the table shows a moderate growth of research?

Country-wise contribution of paper

In today world a country is considered rich if its standard of economy is high and it is counted as a developed one if it has the product of quality research, and development are compliment to each other and play an important role in the growth of economy. The standard or the growth in research of country could be known from its contributions to the publication world. Unless and until a country is undertaken research in the current topics or topics of high importance to the society, it will lagging behind in all respect. The study of ranking of countries is not only interesting but also become crucial. Only top 20 countries are show the graphs.

Table gives the countries wise distribution of core publication

Table 6.3 and Graph 6.3 presents the data relating to growth of literature of publication web 2.0 during 9 years i.e. from 2004-2012. At a look towards the geographical distribution of literature of web2.0, the table depicts that, the authors from 58 countries have shown their interest vigorously for publishing literature of journals. US is proved to be most productive country with 375(22.75%) literature, Research literatures are produced by the authors of 58 countries which is 6.6 on an average per country. In UK 151(9.14%) is the second productivity of the country for publishing literature journal.

It may be concluded here that, 'US' and 'UK' is the most dominant contributor over other countries. India occupied 11 number positions out of 58 countries 35 research papers Publication.

Citation count of research papers

Citation count of research papers provides an indication of usage of published literature and helps to rank the literature sources. It also indicates the quantum of research on a specific subject. The more research, the more will be the usage of published literature and more citations. The following table 6.4 demonstrates

Table 6.3

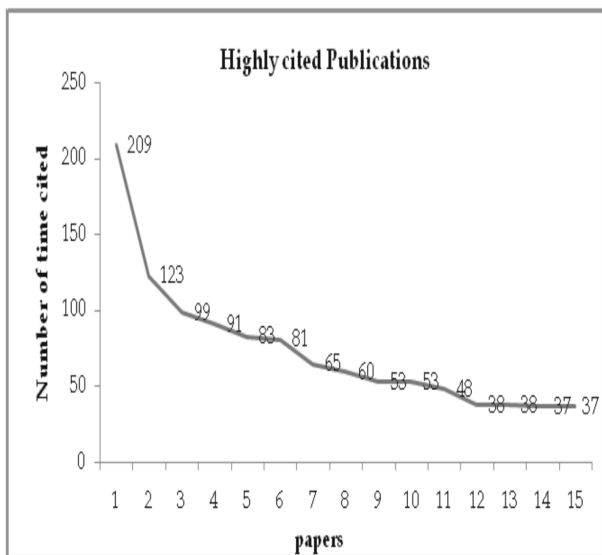
Country	Contribution	%	Country	Contribution	%
United State	375	22.75	Finland	10	0.60
United kingdom	151	9.14	Malaysia	9	0.54
Germany	125	7.57	Thailand	9	0.54
Spain	112	6.78	South Africa	8	0.48
China	105	6.35	Hungary	8	0.48
Australia	93	5.63	Portugal	7	0.42
Taiwan	75	4.54	Mexico	7	0.42
Italy	68	4.11	Iran	7	0.42
Canada	55	3.33	Slovenia	5	0.30
France	43	2.60	Scotland	5	0.30
India	35	2.11	Pakistan	3	0.18
Greece	33	1.99	Bulgaria	3	0.18
Hongkong	31	1.87	Egypt	3	0.18
Austria	28	1.69	Cuba	3	0.18
Japan	23	1.39	Washington	4	0.24
South Korea	22	1.33	Saudi Arbia	5	0.30
Romania	18	1.09	Sanfransico	3	0.18
New Zealand	15	0.90	Belgium	3	0.18
Swizer land	15	0.90	Keney	2	0.12
Brazil	13	0.78	Mecidonia	1	0.06
Netherland	13	0.78	Tanzania	1	0.06
Culombia	12	0.72	Antalatica	1	0.06
Singapore	11	0.66	Russian	2	0.12
Sweden	11	0.66	kuiwta	1	0.06
Turkey	11	0.66	Srilanka	1	0.06
USA	11	0.66	Auckland	1	0.06
Israel	11	0.66	Poland	1	0.06
Ireland	11	0.66	Bangkok	1	0.06
Denmark	10	0.60	Sydney	1	0.06

Graph 6.3: Country wise contribution of research publication (Top-20)

Table 6.4

Number of Citations	Number of Papers
0 Citation	912
01-10	607
10-20	81
20-30	28
30-40	12
40-50	2
50-60	1
60-70	2
70-80	0
80-90	2
90-100	2
100-200	1
200-300	1

Graph 6.4



Web 2.0. As a result, the citation pattern of the top 15 highly cited articles on web 2.0 papers (N=1651) is as follows. The top 15 articles scored a total of 1651 citations, with an average of 110 citations per article. The top 10 articles scored 1000 citations, with an average of 100 citations per article. The top 5 articles scored 607 citations, with an average of 121 citations per article. The top 2 articles scored 336 citations, with an average of 168 citations per article. The top 1 article scored 209 citations.

However, for more clarity and well understanding it may be said here that, the time period under which the papers are indexed in Scopus Online database and was

Table 6.5: Discipline wise distribution of Web 2.0 papers

Discipline wise	No. of Publication (N=1651)	%
Computer Science and information Technologies	475	28.77
Teaching, Learning and Research	287	17.40
Health	152	9.2
Engineering	133	8.06
Library science	121	7.32
Dept. Business Admn.	109	6.6
Telecommunication and Information	96	5.83
Info Management	88	5.33
Social Science	75	4.54
Science and Technology	41	2.48
Dept. of Pure Sc.	41	2.48
Dept transport	6	0.36
Dept Art& Music	5	0.3
Others	22	1.33

during 2004-2012. Above Graph present that the top fifteen highly cited articles on web 2.0.

Article authored by Kamel Boulos MN and Wheeler S., i.e. "the emerging Web 2.0 social software: an enabling suite of sociable technologies in health and health care education." Is having highest citation. (i.e. 209 citation highest in comparison to other articles in the present study). In this article, Web 2.0 technologies and social software are presented as enablers in health and health care, for organizations, clinicians, patients and laypersons. The tools presented in this paper are promising and potentially fit for purpose in many health care applications.

The article ranked second in the list (so far as citations are concerned) is by S. Murugesan on "Understanding Web 2.0" with 123 numbers of citations. In this article the author has discussed that the second version of the web has attracted cross sections of communities including IT professionals, businesses, Web users and many more, who have been applying the basic features of web2.0 such as collaboration and participation into their respective areas of interest.

Graph 6.5

Types of Publications	Research Out put	%
Article	728	44.09
Article in Press	21	1.27
Conference Paper	695	42.09
Editorial	42	2.55
Erratum	4	0.24
Letter	6	0.36
Note	23	1.39
Review	103	6.25
Short Survey	29	1.76
Total	1651	100

The third article in the order is by Dean Giustini, on “How Web 2.0 is changing medicine” with 99 numbers of citations. The author has made an assessment of the impact of web2.0 on medicine. As observed in the article the medical librarians are of the opinion that Web2.0 provides a platform for participation and collaboration of more and more people together.

Discipline – wise distribution of papers

Study of Discipline-wise publication is one of the very important Bibliometric indicators

Graph 6.6

in order to find out the most productive discipline having significant number of publication in web 2.0. The following table-6.5 demonstrates the papers on Web2.0 published in different Disciplines.

Table 6.5 and Graph 6.5 expose the pattern of distribution of research papers among the different areas of application/people of different disciplines. It is found at the outset that there is no uniformity in the research productivity of the various disciplines. It was further discovered that Computer Science and technology and Information Technology are the two highly productive subjects with 234 (14.20%) and 206 (12.48%) papers respectively during 2004-2012. While Teaching Learning and Education and Health are the two mediocre research productive subjects having only 163 (9.87%) and 152(9.20%) contributions respectively. Department of Hotel management and Department of Arts and Music are low productive subject areas of research having only 5(0.30%) publications respectively during the same period in web 2.0.

Types of publications

In the field of web 2.0 research papers are published in various document forms. The major document types of research publications on Web 2.0 include journal articles, conference paper, working papers, book chapters, etc. In order to find out the major document types of Web 2.0 research, the following data have been collected.

Table 6.6 and Graph 6.6 displays the mapping of research papers published in various document types. The above table indicates that maximum number documents belong to 'articles' constituting 728 (44.09%) research papers followed by conference papers (%) and Review (%).

Conclusion

The growth of literature is an indicator of the multidimensional augmentation of a specific subject and therefore, a vital area of

research for theoreticians, information professionals and potential researchers. The importance of web 2.0 research in today's world is undisputable. The present research will enrich the domain of study acknowledging the strength and weakness of Web 2.0 research by observing the literature growth pattern of Web2.0. Gradual growth of Web2.0 literature from the year 2004 to 2012 shows that adoption and implementation of web 2.0 technologies in different spheres of work is increasing day by day.

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