Fall 10-8-2015

Facebook Research: A Scientometric Assessment of Global Publications, 2005-14

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Abstract: - This study is about scientometric assessment of global literature on Facebook research published during 2005-14. In all 7916 papers were identified on "Facebook Research" from Scopus database covering 10 years period 2005-14. The study analyzed growth of publication data and its distribution by documents type, country of publication, authors, their organizations, and subjects. The study identified most productive countries, organization, authors in Facebook research and determined their global publication share, average productivity and comparative citation impact. The Facebook research registered 98.26%, CAGR growth and registered the citations per paper of 5.59. In overall. A total of 109 countries contributed to Facebook research. Facebook research distribution by country is highly skewed since 10 out of 109 productive countries alone account for 70.01% global publication share and 88.80% global citations share. Computer science accounted for the largest publications share, followed by social sciences, engineering, medicine, business, management & accounting, and psychology, etc.

Keywords: Facebook, global publications, bibliometrics, scientometrics, social science

1. Introduction

Social networks have taken over our lives; that they are playing significant role in shaping the dynamics of social interaction online and improving our life experience on the internet. The popularity of social networks is mainly attributed to the new ways that they offer for social collaboration, community building, participation and sharing information in virtual space. Facebook is the largest most popular social networking site on the internet and mobile services commanding close to 7 million visitors per month, twice as many visitors as Twitter and Linkedin put together command. Mark Zuckerberg created it (then called "Thefacebook") just when he was in his dorm room at Harvard University (Markoff, 2007). Within 1 month of its creation, half of the Harvard student population had signed up (Phillips, 2007). Facebook

quickly expanded the list of its approved networks, allowing Facebook to reach a wider range of users. By 2005, Facebook allowed access to over 800 college and university networks as well as high-school networks (Arrington, 2005). In 2006, Facebook continued to expand its network base, allowing access to over 22,000 commercial organization networks (Zywica & Danowski, 2008). Its last major network expansion occurred in 2006, which allowed access to anyone over the age of 13 with a valid e-mail address. The rapid expansion of approved networks was followed by a dramatic rise in user growth. Even with such an incredible success, the growth of Facebook shows little sign of abating. By expanding globally as well as attracting a wider range of age groups, Facebook has been able to continue to maintain its rapid growth. Facebook originated in the United States, but more than 80% of current Facebook users now live outside the United States. Majority of new growth is occurring internationally, with Facebook available in over 70 languages. Facebook has 936 million daily active users on an average for March 2015, 798 million mobile daily active users on an average for March 2015, 1.44 billion monthly active users as of March 31, 2015, 1.25 billion mobile monthly active users as of March 31, 2015. Approximately 82.8% of our daily active users are outside the US and Canada. (Facebook, 2015) As Facebook continues to grow around the world, language is becoming an increasingly important factor for marketers striving to reach their local and global audience. The social network is highly localized and is currently available in over 70 languages [1-5]

Since its creation in February 2004, Facebook has become a spectacular success by creating a massive new domain in which millions of social interactions are played out every day. This burgeoning new sphere of social behavior is inherently fascinating, but it also provides scholars with an unprecedented opportunity to observe behavior in a naturalistic setting, test hypotheses in a novel domain, and recruit participants efficiently from many countries and demographic groups [6-7]. There are many reasons for relevance of Facebook as a topic for research to research scholars. Activities registered on Facebook (e.g., connecting to others, expressing preferences, providing status updates) leave a wealth of concrete, observable data, with potential to provide many opportunities for studying human behavior previously that were difficult to assess (e.g., making friends, chatting). Social scientists are sometimes accused of failing to examine actual behavior, relying instead on hypothetical or retrospective self-reports of behavior [8-9].

Facebook became popular because of social factors, such as the rapid uptake of social media by younger age groups; economic factors such as the increasing affordability of computers and software, and growing commercial interest in social media sites. Facebook can be used anywhere, at any time, where an Internet connection is available. Facebook being popular across a broad spectrum of demographic groups and in many different countries, it has the potential to offer a unique source of information about human behavior with levels of ecological validity that are hard to match in most common research settings. Facebook and other online social networks are interesting topics to social scientists. This is because in addition to reflecting existing social processes, they also spawn new ones by changing the way hundreds of millions of people relate to one another and share information. Also the rise of online social networks brings both new benefits and dangers to society, which warrants careful consideration. The benefits associated with Facebook, such as the strengthening of social ties, are tempered by concerns about privacy and information disclosure [7]. As Facebook becomes increasingly integrated into everyday life, it becomes necessary to monitor and examine the platform's positive and negative impacts on society.

Scholars from a wide variety of disciplines—ranging from law, economics, sociology, and psychology, to information technology, management, marketing, and computer-mediated communication—have recognized the importance of Facebook as a topic for research [7].

It was observed that much of research studies undertaken on Facebook covered issues relating to politics, political process, social movements and business performance. Of the business issues, marketing, organizational performance and efficacy, brand management, and consumer behavior were found to be popular Facebook research topics. Because of their distinct disciplinary affiliations and research goals, research scholars had followed largely independent paths in understanding Facebook research issues and published their findings in a broad range of national and international journals and conference proceedings. Though each discipline-bound study was indeed interesting and valuable in its own right but these studies sough to provide only a narrow view of what is known about Facebook. Besides, online social networks varied dramatically in the breadth of their coverage. Some of the articles focused exclusively on Facebook issues, whereas several others covered Facebook in the context of other online social networks [10].

1.1 Literature Review

The literature review suggests that only a few studies are currently available on quantitative assessment of literature and that these studies focussed mainly on social media, not on Facebook research *per se*. Among such available studies, Coursaris, and Van Osch (11) examined 610 global publications on social media covering the period Oct.2004 - Dec.2012 and determined the contribution and citation impact of individuals, institutions and countries. The findings suggest explosion in publication productivity, identification of leading authors, institutions, countries and of a small set of foundational papers. Social media as a domain displays limited diversity but it is heavily influenced by practitioners. Gan and Wang [12] made a bibliometric assessment of 646 global publications in social media research that had appeared in journals under the subject category "Information Science & Library Science" of the *Social Science Citation Index*. The authors studied distribution of publications output by descriptors, countries, journals, authorships and author keywords and used this distributed data to evaluate research performance and determine research trends. Basak and Calisir [13] made a bibliometric evaluation of the publications (4714) related to Facebook during 2005-13. The annual number of publications increased from 1 in 2005 to 1823 in 2013. The United States was found to be the most productive country and English was the most frequently used language among all publications. Moreover, Computers in Human Behavior was the main distribution channel. Besides, engineering, business and economics, and education were the top three most popular research areas.

The literature review on the application of Facebook to different subject fields presented below underlines that the view that many of these studies were focused more on content analysis as a means for trend monitoring in Facebook research. The review highlights the view that not even a single study had so far appeared on bibliometric analysis of Facebook research.

Wilson, Gosling and Graham [7] reviewed 412 articles on application of Facebook research to social sciences, sorted them into 5 categories: descriptive analysis of users, motivations for using Facebook, identity presentation, the role of Facebook in social interactions, and privacy and information disclosure. Caers, Couck, Stough, Vigna and Dt Bois [14] reviewed articles on Facebook research during 2006-12. They pointed out how many of the articles suffer from limited scope (in terms of small sample size as well as in the number of countries included in the studies) and secondly how frequent changes to Facebook's design and features make it is necessary to revisit many of these articles and integrate their research findings. They also provided a critical discussion and directions for future research. Blachnio, Przepiorka and Rudnicka [15] presented the main trends in Facebook research and explored topics in Facebook research. These include studies that concentrate on personality and individual differences among users, the role of self-efficacy, and motivation for using Facebook. There is a growing trend in empirical studies that focuses on testing advanced theoretical models of Facebook usage determinants. Technology acceptance model, presented in this article, is one of the most often used among them. This kind of approach may serve as a suggestion for a methodological conceptualization in the future confirmatory research on Facebook. Aydin [16] reviewed of Facebook research in the area of education and presented results under six sections: Facebook users; reasons people use Facebook; harmful effects of Facebook; Facebook as an educational environment; Facebook's effects on culture, language, and education; and the relationship between Facebook and subject variables. It concluded there has been a serious lack of research on Facebook's use as an educational resource. Current literature reflects how Facebook might be utilized more readily in the educational environment. According to Tess [17], social media (including Facebook and Twitter) are increasingly becoming visible in higher education settings as instructors look to technology to mediate and enhance their instruction as well as promote active learning for students. Many scholars argue for the purposeful integration of social media as an educational tool. Most of the existing research on the utility and effectiveness of social media in the higher education class is limited to self-reported data (e.g., surveys, questionnaires) and content analyses. Cvijki and Michahelles [18] i categorized Facebook public posts under three trend monitoring topics: 'disruptive events', 'popular topics' and 'daily routines'. They compared the distribution and diffusion of Facebook posts under these categories to determine their characteristics and understand emerging trends on Face book. Warren., Sulaiman and Jaafar [19] findings indicate that activists are using Facebook to shape the traditional civic engagement landscape in an online realm. Future opportunities for this stream of research are then discussed. The analysis was based on the five criteria of Internet activism, i.e. collection of information; publication of information; dialogue; coordinating actions and lobbying for decision makers. The results revealed that activists are using Facebook to seek information, check on others, follow links, post civic messages, promote social events, appeal for donations, call for volunteers, discuss social issues, schedule plans and advocate change.

2. Objectives

The main objectives of this paper are to study Facebook research performance based on publications covered in Scopus database during 2005-14. In particular, the study focused on the following objectives:

1. To study the annual growth and distribution of world literature on Facebook by document type and publication sources;
2. To study the citation pattern of the global research output;
3. To study the contribution, global share and citation impact of top 10 most productive countries;
4. To study the distribution of global research output by broad subject areas and identification of significant keywords;
5. To study the publication productivity and citation impact of top 20 most productive organizations and top 15 most productive authors;
6. To study the leading medium of communication

3. Methodology

The study sourced the Scopus database (http://www.scopus.com) for world publication data on Facebook research covering the period 2005-14. The search statement was formulated using "Facebook" keyword in "title, abstract and keyword" tag and restricting the search output to the period 2005-14 in "date range tag". The main search statement formulated is as shown below. The main search string was further restricted to 10 most productive countries one by one in "country tag" to retrieve stats on their publication data. The main search string was also restricted to "subject area tag", "country tag", "source title tag", and "affiliation tag" to gather data on publications distribution by subject, collaborating countries, organization-wise and journal-wise, etc. The citation data was collected from date of publication till the end of April 2015. The study used a few indicators, including Relative Citation Index, which is defined as the ratio of global share of citations to the global share of publications.

(((TITLE-ABS-KEY ("RFID" OR "Radio Frequency Identification") AND SRCTITLE ("library*" OR "libraries")) AND PUBYEAR > 2001 AND PUBYEAR < 2015) OR ((TITLE-ABS-KEY ("RFID" OR "Radio Frequency Identification") AND KEY ("library*" OR "libraries")) AND PUBYEAR > 2001 AND PUBYEAR < 2015) OR ((TITLE-ABS-KEY ("RFID" OR "Radio Frequency Identification") AND TITLE ("library*" OR "libraries")) AND PUBYEAR > 2001 AND PUBYEAR < 2015))

Data Analysis & Results

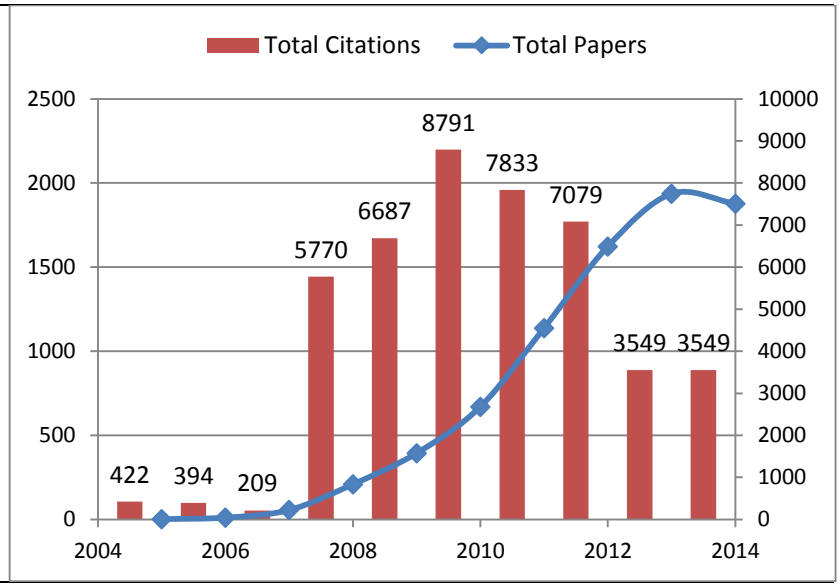
The study sourced Scopus database (http://www.scopus.com) for world publications data on Facebook research covering the period 2005-2014. In all, Facebook research output rose from 2 papers in the year 2005 to 670 in 2010 and to 1877 in 2014, cumulating to a world total of 7916 papers published in 10 years.

Table 1.Growth of Publications and Citations on Facebook Research, 2005-14

Period	TP	TC	ACPP
2005	2	422	211
2006	11	394	35.8
2007	56	209	3.73
2008	209	5770	27.6
2009	394	6687	17

Figure 1: Growth of Publications on Facebook Research and Citations during 2005-2014

2010	670	8791	13.1
2011	1138	7833	6.88
2012	1623	7079	4.36
2013	1936	3549	1.83
2014	1877	3549	1.89
2005-09	672 CAGR = 219.9 %	13482	20.1
2010-14	7244 CAGR = 10.53%	30801	4.25
2005-14	7916 CAGR = 98.26%	44283	5.59
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper			



The Facebook research witnessed 98.26% CAGR growth based on 10 years data 2005-14. However, five-year publication data series covering Facebook research during 2005-09 and 2010-14 differ significantly in their growth rates. Facebook growth declined from 219.9% CAGR during 2005-09 to 10.53% CAGR during the subsequent quinquennial period 2010-15 (Table 1, Figure 1). Of the total publications output on Facebook research, 49.30% (3586) appeared as articles, 40.83% (3240) as conference papers, 3.37% (267) as reviews, 2.70% (22214) as book chapters, 1.65% (131) as articles in press, 1.40% (111) as short surveys, 1.35% (107) as notes , 1.25% (99) as conference reviews, 0.91% (72) as books and the rest as letters, editorial and erratums during 2005-14.

4.1 Distribution Pattern of Citations

Facebook research which cumulated to 7916 papers during 2005-14 received a total of 44543 citations during 2005-14, averaging 5.59 citations per publication in 1 to 10 years citation window. It must be noted that citations to 7916 publications were counted since their publication year till June 2015. Their citation window years therefore varied from 1 to 10 years. For example, a paper published, say, in the year 2005 had 10 years citation window whereas another paper published, say, in the year 2014 had just 1-year citation window (Table 1, Figure 1).

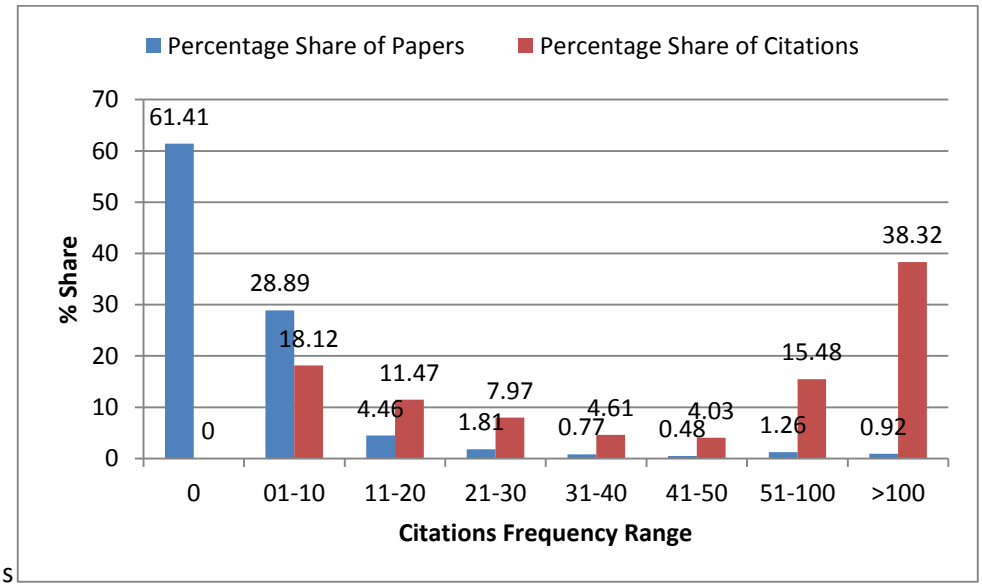
Table 2. Distribution of Papers and Citations on Facebook during 2005-14

Citations Range	No. of Papers	No. of Citations	Percentage of Papers	Percentage of Citations
0	4861	0	61.41	0
1-10	2287	8070	28.89	18.12
11-20	353	5108	4.46	11.47
21-30	143	3552	1.81	7.97

31-40	61	2052	0.77	4.61
41-50	38	1796	0.48	4.03
51-100	100	6897	1.26	15.48
>100	73	17068	0.92	38.32
Total	7916	44543	100	100

The citation quality differed from paper to paper; their citation frequencies varied from one to above 100 per paper. Nearly 61.41% output did not get any citations (zero citation). The rest 38.59% of cited publications were distributed as least-cited to very-highly-cited-papers. Nearly 28.89% publications accounted for 18.12% citations share and their citation rate varied from 1 to 10 citations per paper. 4.46% publications accounted for 11.47% citations share and their citation rate varied from 11 to 20 citations per paper. 1.81% publications accounted for 7.97% citations share and their citation rate varied from 21 to 30 citations per paper. 0.77% publications accounted for 4.61% citations share and their citation rate varied from 31 to 40 citations per paper. 0.48% publications accounted for 4.03% citations share and their citation rate varied from 41 to 50 citations per paper. 1.26% publications accounted for 15.48% citations share and their citation rate varied from 51 to 100 citations per paper. Only 0.92% publications accounted for 38.32% citation share with citations rate above 100 citations per paper (Table 2, Figure 2). Papers with citations 100 or more are rated as highly cited papers.

Figure 2: Citation Profile of Facebook Research, 2005-14



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4.2 Scientometric Profile of Top 10 Most Productive Countries

In all, 109 countries contributed to Facebook research during 2005-14. Some are high productivity countries while others are low productivity ones in Facebook research. Top 10 countries which contributed above 100 publications each are rated as high productivity countries. Individually they

published 191 to 2861 publications and together they contributed 7916 publications (70.01% share) and 44283 citations (88.80% citations share) during 2005-14. Low productivity countries included 58 which contributed 1-10 publications each, 15 countries which contributed 11-20 publications each, 7 countries which contributed 21-30 publications each, and so on.

The 10 most productive countries varied widely in publications share from 2.41% to 36.14% during 2005-14. The USA accounted for the largest share (36.14%), followed by U.K (7.17%), Australia (4.71%), Germany (4.16%), Canada, Taiwan , China (from 3.16% to 3.45%), Spain, Italy and India (from 2.41% to 2.78%). The top 10 most productive countries averaged their citation impact to 5.59 citations per paper. Only three countries scored citation impact above the group average of 5.59: USA (9.65), Canada (8.62) and U.K. (5.99). Three countries scored RCI above world average of 1: USA (1.72), Canada (1.54) and U.K. (1.07). Three countries contributed highly cited papers above the group average share of 1 %: USA (1.85%), Canada (1.83%) and Germany (1.22%). Seven countries contributed international collaborative papers above the average share of 21.89%: China (41.20%), Spain (32.27%), Canada (31.14%), Italy (30.52%), Germany (30.40%), U.K. (28.35%) and Australia (25.20%) (Table 3)

Table 3. Scientometric Profile of Top 10 Most Productive Countries on Facebook Research, 2005-14.

Country	TP	TC	ACPP	%TP	%TC	RCI	HI	ICP	%ICP	HCP	%HCP
USA	2861	27604	9.65	36.14	62.34	1.72	74	451	15.76	53	1.85
U.K.	568	3402	5.99	7.175	7.68	1.07	26	161	28.35	5	0.88
Australia	373	1737	4.66	4.712	3.92	0.83	23	94	25.2	2	0.54
Germany	329	1679	5.10	4.156	3.79	0.91	17	100	30.4	4	1.22
Canada	273	2352	8.62	3.449	5.31	1.54	19	85	31.14	5	1.83
Taiwan	264	623	2.36	3.335	1.41	0.42	13	45	17.05	0	0
China	250	826	3.30	3.158	1.86	0.59	14	103	41.2	1	0.4
Spain	220	420	1.91	2.779	0.95	0.34	10	71	32.27	0	0
Italy	213	523	2.46	2.691	1.18	0.44	11	65	30.52	0	0
India	191	159	0.83	2.413	0.36	0.15	6	38	19.9	0	0
World	7916	44283	5.59				21.3	1213	21.89	70	

TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; RCI=Relative Citation Index; HI= h-index; ICP=International Collaborative Papers; HCP=High Cited Papers

4.3. Subject-Wise Distribution of Publications

The global publications on Facebook research during 2005-14 were grouped under nine subject sub-fields (as reflected in Scopus database classification). Computer science accounts for the largest publications share (53.08%) followed by social sciences (30.99%), engineering (12.83%), medicine (11.04%), business, management & accounting (9.66%), psychology (7.38%), arts & humanities (7.34%), decision science (2.85%) and economics, econometrics & finance (2.60%) during 2005-14.

Table 4. Subject –Wise Distribution of Papers on Facebook Research, 2005-14

S.No	Broad Subject	TP	TC	ACPP	HI	%TP
1	Computer Science	4202	22232	5.29	65	53.08
2	Social Sciences	2453	14679	5.98	26	30.99
3	Engineering	1016	3147	3.10	22	12.83
4	Medicine	874	6846	7.83	10	11.04
5	Business, Management & Accounting	765	4792	6.26	6	9.66
6	Psychology	584	8643	14.80	21	7.38
7	Arts & Humanities	581	2692	4.63	2	7.34
8	Decision Science	226	738	3.26	1	2.85
9	Economics, Econometrics & Finance	206	1038	5.04	1	2.60
	Total of the World	7916				
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index						

The quinquennial research activity, as measured using activity index, witnessed jump in engineering field above the world average of 100 (from 89.54 to 105.80), as against drop below the world average in other fields such as in computer science (from 104.98 to 97.25), social sciences (from 113.85 to 92.34), business, management & accounting (from 163. 81 to 64.71) and biochemistry, genetics & molecular biology (140.41 to 77.65) from 2002-08 to 2009-14. Amongst five subjects, computer science registered the highest citation impact per paper (5.02), followed by social sciences (3.97 biochemistry, genetics & molecular biology (2.13), engineering (1.68) and business, management & accounting (1.50) during 2002-14 (Table 4)

4.4 Scientometric Profile of Top 20 Organizations

The top 20 most productive organizations engaged in Facebook research were compared on a series of indicators such as publications share, citations share, average citations per paper, h-index, and average share in international collaborative papers. The top 20 most productive organization contributed papers 34 to 70 publications each. Together these organizations contributed 11.55% (914) publications share and 26.68% (11884) citation share during 2005-14. The scientometric profile of these 20 organizations is presented in Table 5. Top eight organizations contributed publications output above the group average of 45.7: Michigan State University, USA (70 publications), Carnegie Mellon University, USA (69 publications), Cornell University, USA (54 publications), Pennsylvania State University, USA (53 publications), Microsoft Research, USA (52 publications, University of Maryland, USA (51 publications), University of Wisconsin at Madison, USA (49 publications) and University of Texas at Austin (46 publications). Top five organizations registered citation impact above the group average of 13 citations per publication: Michigan State University, USA (52.74), University of Texas at Austin (24.87), Carnegie Mellon University, USA (14.40), University of Maryland, USA (13.35) and University of California, Irvine, USA (13.28) during 2005-14. Top eleven organizations scored h-index above the group average h-index (9.7): Michigan State University, USA (14), Carnegie Mellon University, USA, University of Maryland, USA and Cornell University, USA (12 each), University of Texas at Austin, University of Michigan, Ann Arbor, USA, Stanford University, (11 each) SA and University of Wisconsin at Madison, USA (11 each), Pennsylvania State University, USA and

Microsoft Research, USA (10 each) during 2005-14. Top eight organizations contributed international collaborative publications above the group average share of 19.47%: University of Cambridge, U.K. (53.66%), Nanyang Technological University, Singapore (34.28%), National University of Singapore (31.59%), Microsoft Research, USA (30.77%), University of California, Irvine, USA (28.20%), University of Illinois at Urbana-Champaign, USA (23.53%), Stanford University, USA (21.43%), and Georgia Institute of Technology, USA (21.05%) during 2005-14.

Table 5. Scientometric profile of 20 Top Most Productive Organizations on Facebook, 2005-14

S.No	Name of the Organization	TP	TC	ACPP	HI	ICP	%ICP	HCP	%HCP
1	Michigan State University, USA	70	3692	52.74	14	11	15.71	7	10
2	Carnegie Mellon University, USA	69	994	14.40	12	11	15.94	2	2.90
3	Cornell University, USA	54	584	10.81	12	9	16.67	0	0
4	Pennsylvania State University, USA	53	473	8.92	10	10	18.87	1	1.89
5	Microsoft Research, USA	52	365	7.02	10	16	30.77	1	1.92
6	University of Maryland, USA	51	681	13.35	12	8	15.69	1	1.96
7	University of Wisconsin at Madison, USA	49	389	7.94	11	7	14.28	0	0
8	University of Texas at Austin	46	1144	24.87	11	5	10.87	4	8.69
9	University of Michigan, Ann Arbor, USA	44	488	11.09	11	4	9.09	0	0
10	Arizona State University, USA	43	239	5.56	9	3	6.98	0	0
11	Stanford University, USA	42	457	10.88	11	9	21.43	1	2.38
12	University of Florida, USA	42	412	9.81	9	2	4.76	1	2.38
13	University of Cambridge, U.K.	41	281	6.85	9	22	53.66	0	0
14	University of California, Irvine, USA	39	518	13.28	9	11	28.20	1	2.56
15	National University of Singapore	38	74	1.95	4	12	31.59	0	0
16	Georgia Institute of Technology, USA	38	160	4.21	6	8	21.05	0	0
17	Indiana University, USA	38	170	4.47	8	5	13.16	0	0
18	Ohio State University, USA	36	425	11.80	10	5	13.89	1	2.78
19	Nanyang Technological University, Singapore	35	137	3.91	7	12	34.28	0	0
20	University of Illinois at Urbana-Champaign, USA	34	201	5.91	9	8	23.53s	0	0
	Total of 20 Organizations	914	11884	13.00	9.7	178	19.47	20	2.19
	Total of the World	7916	44543	5.63					
	Share of Top 20 Organizations in Global Output	11.55	26.68	2.31					

TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; ICP=International Collaborative Papers; HCP=High Cited Papers

4.5 Sceintometric Profile of Top 15 Authors

The top 15 most productive authors engaged in Facebook research were compared on a series of indicators such as publications share, citations share, average citations per paper, h-index, and average share in international collaborative papers. The top 15 most productive authors published 11 to 26 publications each and together they contributed 2.89% (229) publication share and 18.16% (8089) citation share. The scientometric profile of these 15 authors is presented in Table 6. Top five authors contributed above the group average (15.3): N.B. Ellison (26 publications), C. Lampe (24 publications), M.A. Morena (22 publications), M. Kosinski and J. Vitak (18 publications each) during 2005-14. Top two authors registered citation impact above the group average of 35.32 citations per publication: C. Lampe (124.9) and N.B. Ellison (116.8) during 2005-14. Top seven authors scored h-index above the group average of 5.73: N.B. Ellison (11), C. Lampe (10), M.A. Morena (8), J Han (7), B.Y. Zhao, J. Vitak and S.D. Young (6 each) during 2005-14. Top five authors contributed international collaborative publications above the group average share of 22.70%: D. Stillwell (92.31%), M. Kosinski (77.78%), H. Krasnova (69.23%), B.Y. Zhao (33.33%) and S. Lawson (25.00%) during 2005-14.

Table 6. Scientometric profile of 15 Top Most Productive Authors on Facebook, 2005-14

S.No	Name of the Author	Affiliation of the Author	TP	TC	ACPP	HI	ICP	%ICP	HCP	%HCP
1	N.B. Ellison	Michigan State University, USA	26	3037	116.8	11	2	7.69	5	19.23
2	C. Lampe	Michigan State University, USA	24	2998	124.9	10	2	8.33	5	20.83
3	M.A. Morena	University of Wisconsin, Madison, USA	22	233	10.59	8	1	4.54	0	0
4	M. Kosinski	University of Cambridge, U.K.	18	163	9.056	4	14	77.78	0	0
5	J. Vitak	Michigan State University, USA	18	192	10.67	6	1	5.55	0	0
6	S.D. Young	University of California, Ls Angles, USA	14	111	7.929	6	1	7.14	0	0
7	H. Krasnova	Humboldt Universitat zu Berlin, Germany	13	105	8.077	3	9	69.23	0	0
8	D. Stillwell	University of Cambridge, U.K.	13	163	12.54	4	12	92.31	0	0
9	J Han	University of Illinois at Urbana-Champaign, USA	12	99	8.25	7	2	16.67	0	0
10	M. Shehab	University of North Carolina, USA	12	115	9.583	4	0	0	0	0
11	B.Y. Zhao	University of California, Santa Barbara, USA	12	314	26.17	6	4	33.33	1	8.33

S.No	Name of the Author	Affiliation of the Author	TP	TC	ACPP	HI	ICP	%ICP	HCP	%HCP
12	S. Lawson	University of Lincoln, U.K.	12	60	5	5	3	25	0	0
13	D.Y. Wohn	Michigan State University, USA	11	142	12.91	3	1	9.09	0	0
14	D. Boyd	Harward University, USA	11	306	27.82	4	0	0	2	18.18
15	R.Gray	Michigan State University, USA	11	51	4.636	5	0	0	0	0
		Total of 15 Authors	229	8089	35.32	5.73	52	22.71	13	5.68
		Total of the World	7916	44543						
		Share of Top 15 Authors in Global Output	2.89	18.16						
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; ICP=International Collaborative Papers; HCP=High Cited Papers										

4.6 Medium of Research Publication

Of the total 7916 papers, 3929 papers appeared in journals, 2806 in conference proceedings, 562 in book series, 321 in trade publications, 296 as books and 2 undefined during 2005-14. The 3929 journal papers appeared in several journals, of which the top 20 most productive journals contributed 8.70% (689 papers) share. The quinquennial share of global publications covered in top 20 journals increased from 6.55% during period 2005-09 to 8.90% during 2010-14. The list of 20 most productive journals is shown in Table 7. The largest number of papers (175) was published in *Computers in Human Behavior*, followed by *Cyberpsychology, Behavior & Social Networking* (80 papers), *First Monday* (51), *Journal of Medical Internet Research* (49 papers), *New Media and Society* (34 papers), *Public Relations Review* and *Information Communication & Society* (30 papers each), etc.

Table 7. Top 20 Journals Publishing on Facebook Research, 2005-14

S.No.	Name of the Journal	Number of Papers		
		2005-09	2010-14	2005-14
1	Computers in Human Behavior	3	172	175
2	Cyberpsychology, Behavior & Social Networking	0	80	80
3	First Monday	11	40	51
4	Journal of Medical Internet Research	1	48	49
5	New Media and Society	3	31	34
6	Public Relations Review	2	28	30
7	Information Communication & Society	1	29	30
8	PLOS One	0	26	26
9	Fortune	8	14	22

10	Journal of Computed Mediated Communication	8	13	21
11	Business Horizons	1	19	20
12	Computers & Education	0	20	20
13	Social Science Computer Review	1	17	18
14	Australasian Journal of Educational Technology	0	18	18
15	Mediterranean Journal of Social Sciences	0	17	17
16	American Journal of Pharmacy Education	2	15	17
17	Proceedings of the ASIST Annual Meetings	0	16	16
18	International Journal of Web Based Communities	0	16	16
19	IEEE Spectrum	2	13	15
20	Strategic Direction	1	13	14
	Total of 20 journals	44	645	689
	Total of the world	672	7244	7916
	Share of 20 journals in world total	6.55	8.90	8.70

4.7 Most Significant Keywords

Top 76 most frequently used keywords for searching global literature on Facebook research were identified. These are listed in Table 8 along with frequency of their publications hits. The frequency of publications hits was the largest for the keyword Facebook (3540) followed by Online social networks (3279), social networks (2069), social media (1556), internet (1025), social networking site (794), students (427), etc.

Table 8. List of Most Significant Keywords Appearing in Global Literature on Facebook, 2005-14

S.No	Keyword	Frequency	S.No	Keyword	Frequency	S.No	Keyword	Frequency
1	Facebook	3540	26	E-Learning	129	52	Universities	43
2	Social Networks (Online)	3279	27	Social Interactions	111	53	College Students	47
3	Social Network or Networking	2069	28	Social Network Services	101	54	Libraries	41
4	Social Media	1556	29	Human Relations	100	55	Sales	39
5	Internet	1025	30	Interpersonal Relations	98	56	Computer Aided Instruction	37
6	Social Networking Sites	794	31	Commerce	98	S7	Learning	33
7	Students	427	32	Industry	93	58	Collaborative Learning	31
8	World Wide Web	365	33	Social Behavior	92	59	Tourism	30
9	Privacy	358	34	Blogging	89	60	Heath Education	29
10	Twitter	341	35	Virtual Reality	89	61	Undergraduate Studies	28
11	Web 2.0	302	36	Social Network Analysis	86	62	Academic Libraries	28
12	Information Systems	280	37	Electronic Commerce	85	63	Viral Marketing	25
13	Data Privacy	259	38	Social Relationship	74	64	Marketing of Health Services	25
14	Online Systems	229	39	Economic & Social Effects	73	65	Social Commerce	25

15	Behavior Research	222	40	Engineering Education	72	66	Competition	23
16	Social Science Computer	217	41	Higher Education	63	67	Consumer Behavior	22
17	Data Mining	202	42	Advertising	60	68	Economics	21
18	YouTube	194	43	Sales	60	69	Financial Management	19
19	Marketing	187	44	Medical Information	57	70	Public Relations	19
20	Information Technology	180	45	Curricula	55	71	Marketing Stategy	18
15	Research	168	46	Medical Education	50	72	Social Marketing	18
21	Teaching	160	47	Public Relations	49	73	Human Relations	17
22	Education	143	48	College Students	47	74	Digital Libraries	16
23	Social Support	135	49	University Studies	46	75	University Libraries	12
24	Psychological Aspects	133	50	Health Services	46	76	Brand Image	9
25	Mobile Devices	132	51	Health Promotion	45			

Summary & Conclusion

The world output on Facebook research cumulated to 7916 publications over 10 years during 2005-14. Facebook research witnessed 98.26% compounded annual growth during this 10 publication years. However, five-year publication data series covering Facebook research during 2005-09 and 2010-14 differ significantly in their growth rates. Facebook growth declined from 219.9% CAGR during 2005-09 to 10.53% CAGR during the subsequent quinquennial period 2010-15. Such a sharp decline in Facebook growth should be a matter of great concern; it calls for understanding the reasons underlying this sort of change in growth trend. The world publications output on Facebook research is highly skewed. For instance, top 10 most productive countries (USA, U.K., Australia, Germany, Canada, Taiwan, China, Spain, Italy and India) together accounted for as much as 70% world publications share and 88% world citations share. The USA has emerged as the world leader in Facebook research (with 36.14% share, the largest by any country). In all, more than 100 countries participated in Facebook research during 2005-14. Analysis of citation data on Facebook research reveals that over 1/3rd (38.59%) publications were cited since their publication year till April 15, 2015. Secondly, citation quality of Facebook research differed widely from paper to paper. The top 0.92% publications received 100 and above citations per paper and it accounted for the highest (38.32%) citations share, whereas 28.89% publications (which received from 1 to 10 citations per paper) accounted for low citations share, as low as 18.12%. Computer science accounts for the largest publication share of 53.08%, followed by social sciences (30.99%), engineering (12.83%), medicine (11.04%), business, management & accounting (9.66%), psychology (7.38%), arts & humanities (7.34%), decision science (2.85%) and economics, econometrics & finance (2.60%) during 2005-14.

Even as Facebook research distribution by country of publication stands skewed, but publications output by participating organizations connotes a different distribution trend. Facebook research publications are

widely scattered across participating organizations. For instance, top 20 most productive organizations in Facebook research barely accounted for 11.55% share (914 publications) and 26.68% citations share (11884 citations) during 2005-14. Besides, research output also stood widely scattered even at the level of contributing authors. For instance, top 15 most productive authors in Facebook research barely accounted for small 2.89% share (229 publications) and 18.16% citation share (8089 citations). This sort of scattering of Facebook research publications across participating organizations as well as contributing authors seeks to highlight a point that centres of excellence in Facebook research have yet to emerge.

Practical recommendations: The study finds that there has been a serious lack of interest in utilizing Facebook as an educational resource. The study recommends exploring the role of Facebook in the education sector, and suggests using Facebook as a social network analysis tool and as an educational resource.

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