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# Scientometric portrait of Mike Thelwall

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## Abstract

Mike Thelwall was honoured with the Derek John de Solla Price Award (2015) at his 50 years age and at 20 years of research publishing career. The first contribution of the author was in 2000 at the age of 35. His publications were analysed by year, growth of publication pattern, collaboration pattern, authorship pattern, channels of communications used and keywords etc. He had 297 publications during 2000-2015 in domains: Computer Science (237), Social Sciences (183), Decision Sciences (50), Mathematics (45), Engineering (11), Medicine(7), Agricultural and Biological Sciences (6), Biochemistry, Genetics and Molecular Biology (6), Economics, Econometrics and Finance (3), Physics and Astronomy (3), Arts and Humanities (2), Business Management and Accounting (2), Psychology (1) and Multidisciplinary (1). Collaborative authorship pattern is found to be in the team size of 2-above 5. Fifty-seven are single authored papers, 136 two authored, 63 three authored, 21 four authored, 7 five authored and 13 above five authored. Two and Three authored papers constitute nearly 67 percent of the total authorship of his papers while single author papers are nearly 19 percent of the total authorship.

**Keywords:** Mike Thelwall, Scientometric portrait, Collaboration, Authorship status, Biobibliometrics and Individual scientist

## Introduction

Scientometrics is an application of quantitative methods to the history of Science. It is also one of the techniques for documenting, collecting works of eminent scientists and researcher's. A scientometric study deals with the quantitative (where they are published) documentation of the communication of science by a given scientist. Scientific publications seem to have provided the best available basis for measuring the outputs of individual scientists as there is a good correlation between the eminence of scientists and their sustained

scholarly publications (Hertz and Price, 1986 & 1987). Scientometric studies are highly valued by historians of science, biographers of scientists, administrators of scientific establishments, science policy makers, R & D managers, educationalists, scientometricians, young scientists, documentalists, information scientists and science journalists (Stockley, 1957).

Bio-bibliometrics deals with the biographical study of the individual careers of scientists and researchers and correlating bibliographic analysis of publications or academic and scientific achievements. Individuals are the source of ideas. The institutions are built by the individuals and grow around individuals. Individuals are the basic foundations of any institution. By studying the individuals who have reached the top positions in academic and research life and by highlighting their works may stimulate the younger generation to emulate them. 'Bio-bibliometrics' is a term that was first coined by Sen and Gan (1990) to mean as the quantitative and analytical method for discovering and establishing functional relationships between bio-data and biblio-data elements. There are many bio-bibliometric studies, but they have hardly used the term 'bio-bibliometrics' in the titles of the papers except for Sen & Gan (1990) and Tiew (1999).

Kalyane and Kalyane (1993) first used the phrase 'Scientometric Portrait' to carry out bio-bibliometric studies on scientists. In some of the papers Kalyane and Devarai (1994) and Kalyane and Samanta (1995), used the term 'Informetrics' in the titles of their papers on C. S. Vekata Ram and K. Ramiah respectively.

However, there was a continuous use of the phrase 'Scientometric Portrait' (Kalyane and Kalyane, 1993; Kalyane and Kalyane, 1994; Kademani and Kalyane, 1994; Kademani and Kalyane, 1994; Kalyane, 1995; Kalyane and Kademani, 1995, Kalyane and Munnolli, 1995; Kalyane and Sen, 1996; Kademani, Kalyane and Kademani, 1996; Kademani and Kalyane, 1996; Kalyane and Kademani, 1997; Kalyane and Sen, 1998; Kademani and Kalyane, 1998; Kademani, Kalyane and Jange, 1999; Kademani, Kalyane and Kumar, 2000; Kademani, Kalyane and Kumar, 2001; Kalyane, Prakasan and Kumar, 2001; Kalyane, Prakasan and Vijay Kumar, 2002; , Kalyane and Kumar, 2002; , Kalyane and Kumar, 2002; Munnolli and Kalyane, 2003; Koganuramah, et al., 2004; Angadi et al., 2004; Kademani et al., 2005) consistently.

The present study is attempted to draw a productivity, collaboration and authorship status of Mike Thelwall, professor of Statistical Cybermetrics Research Group at the University of Wolverhampton.

### **Biographical Sketch**

Mike Thelwall is the Professor of Information Science and leader of the Statistical Cybermetrics Research Group at the University of Wolverhampton, which he joined in 1989. He is also Docent at the Department of Information Studies at Abo Akademi University, and a research associate at the Oxford Internet Institute. His PhD was in Pure Mathematics from the University of Lancaster. He has an associate editor of the Journal of the Association for Information Science and Technology and sits on three other editorial boards. In the UK's 2008 Research Assessment Exercise, the group was awarded jointly the second highest average score in Library and Information Management and three quarters of the group's submissions in the field of webometrics and scientometrics were rated as 'World leading'. In the UK's 2014 Research Excellence Framework (the REF) the Statistical Cybermetrics Research Group received an average score of 3.37 out of 4 with almost all of published research rated as 'world leading' or 'internationally excellent'. In 2015 the Statistical Cybermetrics Research Group won the University of Wolverhampton's Award for Excellence in Research.

His contribution has been mainly in the development of theories and methods for extracting and analysing web data from an information science perspective. Mike has investigated many emerging areas and has addressed research problems in link analysis, citation analysis, altmetric analysis, and sentiment analysis. He has also contributed to quantitative methods in scientometrics and bibliometrics. Mike's scientific achievements have been disseminated in his three books, over 200 peer-reviewed journal articles and numerous conference presentations. Mike has published over 100 articles in the journal of the Association for Information Science and Technology, Scientometrics and the Journal of Informetrics. He served as an associate editor of Journal of the Association for Information Science and Technology and on the editorial boards of seven journals, including the Journal of Informetrics and Scientometrics. He has reviewed over 700 articles for academic journals in the profession.

Apart from teaching and research he has designed and developed four free computer applications: Webometric Analyst which is an altmetrics, web citation and webometrics data

collector and analyser, SocSciBot which is a web crawler and hyperlink analyser, Mozdeh which is a Twitter time series analyst, and SentiStrength which is sentiment strength detection software. His tools help the researchers and students to collect and analyse the data from a range of web sources, such as the Bing search engine, YouTube, Twitter, the Mendeley reference manager, Google Books, Online Syllabi, Academia, Research Gate and World cat (Kousha and Levitt, 2015).

### **Scope of the study**

Scientometric portrait study is a quantitative analysis of the publications of an author or a scientist, either living or dead. It concludes all publications brought out during one's life time. In the present study is confined 297 contributions of Thelwall published in various national and international journals, conference proceedings, etc; during 2000-2015.

### **Objectives of the Study**

The main objectives of the study are;

1. to find out the year-wise distribution of authorship pattern;
2. to determine the position of Thelwall as main author and as co-author;
3. to measure the degree of relationship between main author and co-author;
4. to calculate author productivity;
5. to observe publication pattern according to age;
6. to identify the research team;
7. to identify high frequency keywords in the titles; and
8. to find out channel-wise scattering of publication

### **Methodology**

Publications count and analysis is one of the bibliometric/scientometric analytic techniques. It involves studying the number of publications in a single author, or productivity of literature in the field, with the aim of comparing “the amount of research in different countries, the amount produced during different periods, or the amount produced in different subdivisions of the field” (Hertzal, 1987). Using the same technique, the study reported here analyse the single author study about *‘Mike Thelwall. Scientific publications seem to provide the best available basis for measuring the research output. The data for this study has been obtained from Scopus International Database to extract relevant data on Mike Thelwall for the sixteen years (2000-2015) and 297 records were retrieved. Thus a total of 297 records of*

different type viz. articles (213), conference papers (56), reviews (21), book chapters (5), erratum and article in press (1), were retrieved. The collected data were transferred into Microsoft Excel 2007, and subjected to further analysis to meet the objectives and using some scientometric indicators and percentage analysis. The data covered in the Scopus database only, even though some of the publications were not covered in this database.

## **Data Results and Discussion**

### **Productivity**

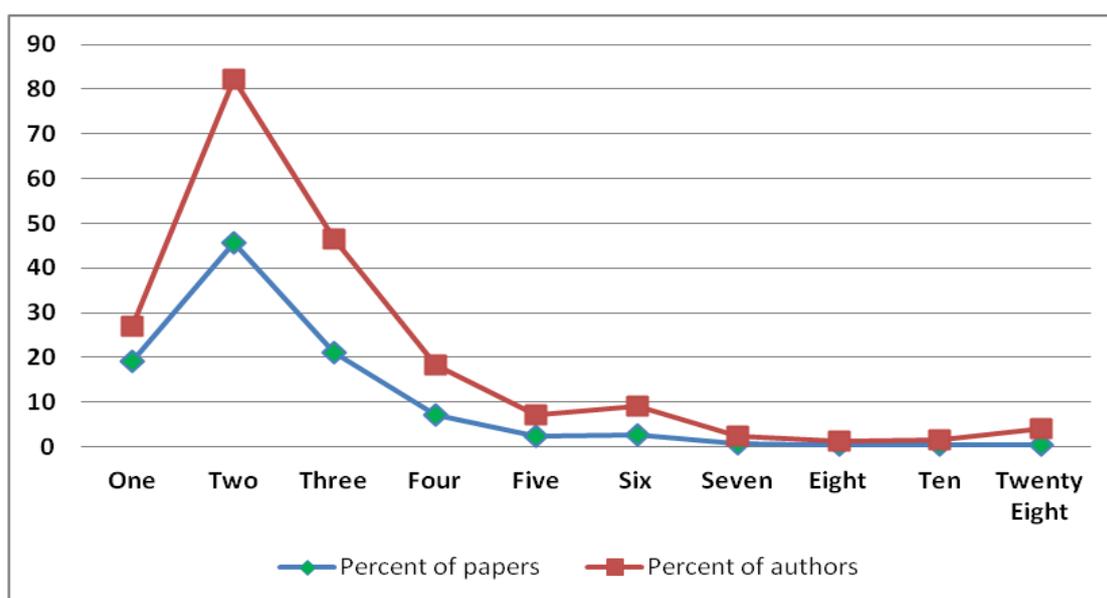
The literature of any subject reflects not only basic publishing pattern but also the characteristics of the author themselves. The author influence on the document is significant and very essential factor for scientometric research. Authorship pattern can be deciphered in areas like author productivity, collaborative or multiple authors and also the author choice in the form of publications. Mike Thelwall has published 297 papers during 2000-2015. He has to his credit 57 single-authored, 136-double-authored, 63-three authored, 21 four-authored, 7 five-authored, 8 six-authored, 2 seven-authored, eight, ten and twenty eight authored has one publication each respectively. He is the main author in 123 papers and co-author in 174 papers. Table 1 show that there are 745 co-authors in Mike Thelwall papers. Two and three-authored papers constitute nearly 67% of the total authorship while single author papers shares nearly 19% of the total authorship.

Chronological distribution of the papers along with collaborative pattern is presented in Table 2. His first two papers were published in 1991 at the age of 26 but these publications are not covered in this study. Quinquennial distribution of his papers along with his productivity age depict that he had 66 papers during the first quinquennium. This was preceded by 101 papers in the next five years (2006-2010) and was followed 130 papers in the 3<sup>rd</sup> quinquennial period.

It is evident that his research activities attained momentum during 2007 at the age of 42 years. Out of 297 papers, 124 belong to multi-authored papers, i.e., 41.8%. Six single authored papers out of total 34 belong to the third quinquennium viz., 2010-2015 at the age of 45-50. His 50 percentile productivity life is 4 years i.e., the 38<sup>th</sup> year of his life. Table 2 also depicts that the quinquennial trend in Thelwall single-authored and multi-authored papers and cumulative number of total papers.

**Table 1 - Distribution of papers of Mike Thelwall by number of authors**

No. of authors	No. of papers	Percent of papers	Number of authors	Percent of authors
One	57	19.19	57	7.65
Two	136	45.79	272	36.51
Three	63	21.21	189	25.37
Four	21	7.07	84	11.28
Five	7	2.36	35	4.70
Six	8	2.69	48	6.44
Seven	2	0.67	14	1.88
Eight	1	0.34	8	1.07
Ten	1	0.34	10	1.34
Twenty Eight	1	0.34	28	3.76
<b>Total</b>	<b>297</b>	<b>100</b>	<b>745</b>	<b>100</b>



**Figure 1 - Distribution of papers of Mike Thelwall by number of authors**

**Table 2 - Year and age-wise distributions of papers by Mike Thelwall**

Quinque nnium	Pub. Years	Number of authors								Publications		Total	Age of MT	Productivity life (age)
		One	Two	Three	Four	Five	Six	Seven	>Seven	Main author	Co author			
Q1	2000	4	-	1	-	-	-	-	-	4	1	5	35	1
	2001	8	-	-	-	-	1	-	-	9	-	9	36	2
	2002	11	4	-	-	-	1	-	-	13	3	16	37	3
	2003	4	8	3	3	1	1	-	-	12	8	20	38	4
	2004	5	10	-	-	1	-	-	-	11	5	16	39	5
Q2	2005	4	10	3	2	-	-	-	-	8	11	19	40	6
	2006	3	9	5	-	-	-	-	-	11	6	17	41	7
	2007	1	11	7	1	-	-	-	-	5	15	20	42	8
	2008	7	14	3	2	-	-	-	-	12	14	26	43	9
	2009	4	9	6	-	-	-	-	-	4	15	19	44	10
Q3	2010	2	8	5	4	-	-	-	-	8	11	19	45	11
	2011	1	4	5	1	-	-	2	2	4	11	15	46	12
	2012	1	6	10	-	-	1	-	-	4	14	18	47	13
	2013	-	15	3	3	3	2	-	1	4	23	27	48	14
	2014	-	11	5	3	2	2	-	-	4	19	23	49	15
	2015	2	17	7	2	-	-	-	-	10	18	28	50	16
	Total		57	136	63	21	7	8	2	3	123	174	297	
Percent		19.19	45.79	21.21	7.07	2.36	2.69	0.67	1.01	41.41	58.59			



## Authorship pattern

Authorship studies provide valuable information concerning characteristics of authors, their collaboration, assessing and monitoring research activities among others (Kwadzo and Grace, 2008). Collaboration among scientists implies that they are working together and pursuing a common scientific goal (Kundra, 1996). Authorship pattern represents the number of authors per paper. When a researcher starts publishing papers in the beginning of his research career, generally the papers is published in colloboration with his research guide or senior colleagues.

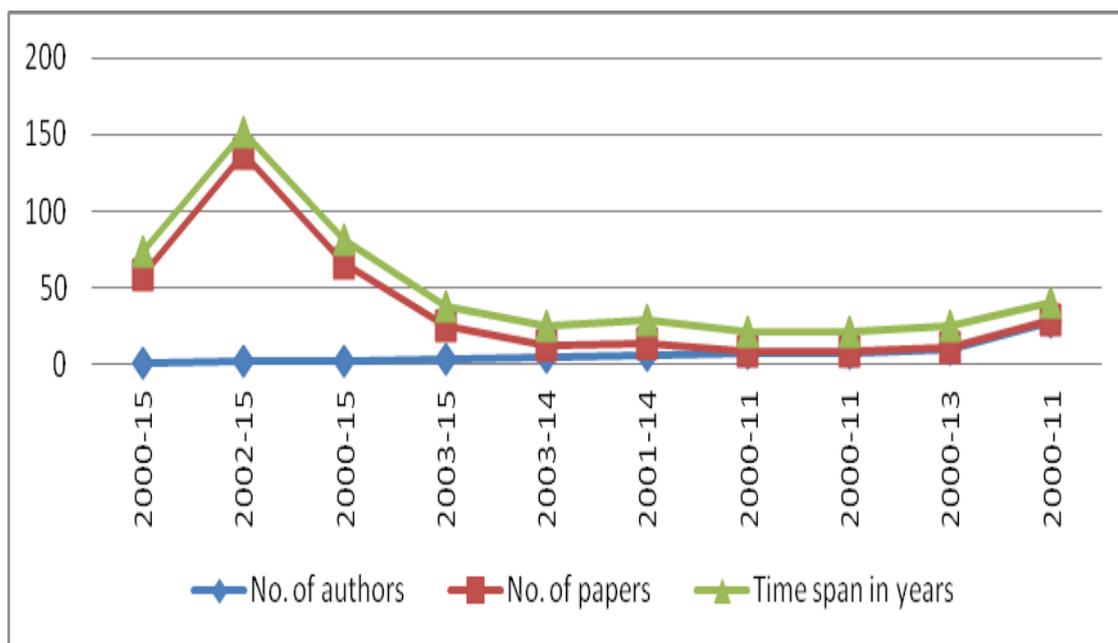
Hence, the initial papers of the scientist are in many cases co-authored with his guide. As the scientist becomes mature and rises in position, he would start to write papers on his own. From Table 3 it appears that the author has contributed only 57 papers without any colloboration during the entire span of his productive carrier. All the other papers (240) are the result of colloboration. Table 4 represents authorship pattern with the time span of colloboration. Two-author colloboration has resulted in the largest number of papers, i.e. 139, naturally with the maximum time span of 14 years. Three-author papers totalling 63 was published in a time span of 16 years.

**Table 3 - Authorship pattern**

No. of authors	1	2	3	4	5	6	7	8	10	28	Total
No. of non collaborative papers	57	-	-	-	-	-	-	-	-	-	57
No. of collaborative papers	-	136	63	21	7	8	2	1	1	1	240

**Table 4 - Time span of authorship pattern**

No. of authors	1	2	3	4	5	6	7	8	10	28	Total
No. of papers	57	136	63	21	7	8	2	1	1	1	297
Time span	2000-15	2002-15	2000-15	2003-15	2003-14	2001-14	2000-11	2000-11	2000-13	2000-11	
Time span in years	16	14	16	13	13	15	12	12	14	12	



**Figure 2 - Time span of authorship pattern**

### Single Authorship Vs Multiple Authorship

Table 5 shows the detailed break-up of single author and multiple authored. The single authored papers are predominant over multi-authored papers in the beginning stage i.e., 2000, 2001 and 2003. Afterwards, each year shows that multi-authorship are predominant over single authorship i.e., 2003-2012. Percentage of single authorship and multi authorship are calculated for each year and it is seen that highest percentage of NM papers is 100% in the years 2013 and 2014. In 2013 and 2014 none of the paper is published by single author. All single authorship constitutes only 19.19% and multi authorship constitutes 80.81%.

**Table 5 - Break-up of Single Authorship Vs Multiple Authorship**

Sl. No	Year	Single Authored	% age	Multi authored	% age	Total papers
1	2000	4	80.00	1	20.00	5
2	2001	8	88.89	1	11.11	9
3	2002	11	68.75	5	31.25	16
4	2003	4	20.00	16	80.00	20
5	2004	5	31.25	11	68.75	16
6	2005	4	21.05	15	78.95	19
7	2006	3	17.65	14	82.35	17
8	2007	1	5.00	19	95.00	20
9	2008	7	26.92	19	73.08	26
10	2009	4	21.05	15	78.95	19

11	2010	2	10.53	17	89.47	19
12	2011	1	6.67	14	93.33	15
13	2012	1	5.56	17	94.44	18
14	2013	0	0.00	27	100.00	27
15	2014	0	0.00	23	100.00	23
16	2015	2	7.14	26	92.86	28
Total		57	19.19	240	80.81	297

### Measure of Collaboration

Several indices were calculated to know the status of collaboration by Professor Mike Thelwall at Statistical Cybermetrics Research Group at the University of Wolverhampton during 2000-2015. These indices are Collaborative Index, Degree of Collaboration, Collaborative Coefficient, and Modified Collaborative Coefficient. The following notations are used in the equations to calculate Collaborative Index, Degree of Collaboration, Collaborative Coefficient, and Modified Collaborative Coefficient.

$f_j$  – Number of papers having  $j$  authors in certain subjects

$N$  – Number of papers in a certain subject.

$K$  – Greatest number of collaborating authors for a paper for a certain subject.

### Collaborative Index (CI)

This is defined as (Lawman, 1980)

$$CI = 1 - \frac{\sum_{j=1}^k \frac{1}{j} \cdot f_j}{N}$$

It gives a mean number of authors per paper. It has no upper limit and cannot be expressed as a percentage.

### Degree of Collaboration (DC)

This formula is expressed as (Subramanyam, 1983)

$$DC = 1 - \frac{f_1}{N}$$

Where  $f_i$  is the number of single author papers. DC can be interpreted as a degree, i.e., lies between 0 and 1. A value of 1 means maximum collaboration. It always ranks higher in a discipline with a higher number of multi-authored papers.

### Collaborative Co-efficient

Collaborative coefficient can be defined as (Ajiferuke et al., 1988).

$$CC = 1 - \frac{\sum_{j=1}^k \frac{1}{j} \cdot fj}{N}$$

In the case of CC, each paper carries a certain credit which is shared between all the authors, i.e., for a paper with j authors, each author gets a credit of 1/j. CC always lies between 0 and 1. As the number of single authors dominate CC  $\rightarrow 0$ . CC distinguishes between single authors and multiple authors. The problem with CC is that it does not give the value 1 for +maximum collaboration except when the number of authors is infinite.

Table 6 represent that, aforesaid three collaboration indices for 16 years (2000-2015) for publications by Prof. Mike Thelwall at the University of Wolverhampton. The table also shows that the publication pattern of single and multi authorship pattern.

Collaboration index that is a measure of mean number of authors per percent varies between 1.31 and 3.13 with a mean value of 1.92. The degree of collaboration is 0.11 in 2001 and it could be comes 0.95 in 2007. In 2013 and 2014 it was increased up to 1.00. Average degree of collaboration is 0.74 which indicates that, Thelwall has prefers collaboration work in his research. (DC = 1 indicates that there is no single authored papers). Collaborative coefficient indices that the differences between the levels of authorship pattern. In 2001 the CC range is 0.07 and it comes in 2014 CC is 0.59.

**Table 6 - Collaboration indices CI, DC and CC**

Year	Single Author	Two Authors	> Two Authors	Total	CI	DC	CC
2000	4	0	1	5	1.40	0.20	0.13
2001	8	0	1	9	1.56	0.11	0.07
2002	11	4	1	16	1.31	0.31	0.17
2003	4	8	8	20	2.20	0.80	0.47
2004	5	10	1	16	1.25	0.69	0.35

2005	4	10	5	19	1.63	0.79	0.44
2006	3	9	5	17	1.59	0.82	0.46
2007	1	11	8	20	1.85	0.95	0.54
2008	7	14	5	26	1.46	0.73	0.40
2009	4	9	6	19	1.63	0.79	0.45
2010	2	8	9	19	2.37	0.89	0.53
2011	1	4	10	15	3.13	0.93	0.58
2012	1	6	11	18	2.39	0.94	0.57
2013	0	15	12	27	2.70	1.00	0.57
2014	0	11	12	23	2.61	1.00	0.59
2015	2	17	9	28	1.71	0.93	0.52

### Research team

Table 7 represents research team of Mike Thelwall and discloses that the scientist has worked with 158 collaborators in his productive career and produced as many as 240 papers in collaboration with K. Kousha who is found to be the most productive collaborator of Mike Thelwall. There are about a dozen other collaborators with whom he has produced more than 10 papers, apart from the significant collaborator of D. Wilkinson.

**Table 7 - Research team of Mike Thelwall**

Rank	Authors	Total no. of papers
1	Kousha, K.	27
2	Wilkinson, D.	20
3	Paltoglou, G.	18
4	Buckley, K.	15
4	Levitt, J.M.	15
6	Vaughan, L.	10
7	Harries, G.	9
7	Stuart, D.	9
7	Sugimoto, C.R.	9
10	Fairclough, R.	8
10	Li, X.	8
10	Price, L.	8
13	Larivière, V.	7
13	Payne, N.	7

13	Prabowo, R.	7
13	Sud, P.	7
17	Park, H.W.	6
17	Tang, R.	6
19	9 authors	5 papers each
28	8 authors	4 papers each
36	16 authors	3 papers each
52	23 authors	2 papers each
75	85 authors	1 paper each
Total	158 authors	

### Publication size

It is clear from Table 8 that out of 297 papers, a majority of 114 (38.38%) papers published in 11-15 pages, followed by 85 (28.62%) papers on 6-10, 46 papers published in 16–20 pages, 29 papers published in 1-5 pages and 20 (7.75%) papers published in more than twenty papers. Table 7 also shows that majority of single and joint authors were published their research papers in 11-15 pages.

**Table 8 - Size of publication in pages by Thelwall and his co-authors**

Size of publication in pages	Single authored	Two authored	Three authored	> three authored	Total	% age
One - Five	6	11	7	5	29	9.76
Six - Ten	22	37	15	11	85	28.62
Eleven - Fifteen	21	56	25	12	114	38.38
Sixteen - Twenty	6	21	12	7	46	15.49
Twenty one – Twenty five	1	9	2	4	16	5.39
More than twenty-five	1	2	2	2	7	2.36
Total	57	136	63	41	297	100.0

### Keywords

Table 9 represents frequencies of keywords used in the title of the papers. In all, 160 keywords have figured in 297 papers. Of these keywords, websites has appeared in as many as 48 titles followed by internet & webometrics (39), search engines (33), research (29), information science (28), World Wide Web (27), citation analysis & information retrieval

(23) and data mining (20). It depicts that the main focus of study of professor mike Thelwall was websites.

**Table 9 – High frequency keywords in the titles of the publications of M. Thelwall**

Keywords	Frequency	Keywords	Frequency
Websites	48	Bibliometrics	11
Internet	39	Communication	11
Webometrics	39	Link Analysis	11
Search Engines	33	Research Evaluation	11
Research	29	Altmetrics	10
Information Science	28	Hyperlinks	10
World Wide Web	27	Information Analysis	10
Citation Analysis	23	Online Searching	10
Information Retrieval	23	Online Systems	10
Data Mining	20	Hypertext Systems	9
Algorithms	18	Information Dissemination	9
Social Sciences	16	Web Links	9
Education	15	Citation Impact	8
Sentiment Analysis	15	Content Analysis	8
Scholarly Communication	14	Scientometrics	8
Social Networking (online)	14	Social Networks	8
Societies And Institutions	13	Universities	8
Publishing	12	Article	7

### **Communication channels**

Among 297 scientific papers, a total of 213 were research papers published in 47 different channels of communication. Channel-wise scattering of publications by him is provided in Table 10. The journals published by Mike Thelwall are Journal of the American Society for Information Science and Technology (46), Scientometrics (26), Journal of Informetrics (17), Journal of Information Science (13), Journal of Documentation and Journal of the Association for Information Science and Technology (11). Fifty five percent of his research papers were published in top ranking numbering Nine. His published paper in the journal namely journal of Computer-Mediated Communication had very high impact factor (3.541), with a total of three articles.

**Table 10 -Ranking of the channels of communication used by Mike Thelwall**

Rank	Title	No. of papers	Cumulative no. of paper	FBY-LBY	IF
1	Journal of the American Society for Information Science and Technology	46	46	2001-2013	2.941
2	Scientometrics	26	72	2002-2015	2.084
3	Journal of Informetrics	17	89	2007-2015	2.373
4	Journal of Information Science	13	102	2001-2015	0.878
5	Journal of Documentation	11	113	2000-2015	1.063
5	Journal of the Association for Information Science and Technology	11	124	2014-2015	1.864
7	Online Information Review	9	133	2002-2009	1.152
8	Information Processing and Management	8	141	2004-2011	1.397
9	First Monday	5	146	2004-2011	1.047
9	Library and Information Science Research	5	151	2003-2015	1.230
11	Aslib Proceedings	4	155	2001-2012	0.676
11	Cybermetrics	4	159	2001-2013	1.091
11	Internet Research	4	163	2000-2008	3.017
11	PLoS ONE	4	167	2011-2014	3.540
15	Aslib Proceedings: New Information Perspectives	3	170	2008-2011	0.676
15	Information Research	3	173	2003-2010	0.531
15	Journal of Computer-Mediated Communication	3	176	2007-2014	3.541
15	Proceedings of the ASIST Annual Meeting	3	179	2002-2012	NA
15	Research Evaluation	3	182	2006-2015	1.467
20	2 periodicals having two paper each	4	186	2006-2013	-
21	27 periodicals having one paper each	27	213	2000-2015	-

FPY = First paper year, LPY = Last paper year, NA = Not Available, IF = Impact Factor

### Bradford's distribution

Bradford's law is one of several statistical expressions that try to describe the workings of science by mathematical means (Garfield, 1979). It describes how the literature on a particular subject is scattered or distributed in various journals. If journals are ranked by the number of articles they contain on a given topic they can be divided in to a central nucleus of the most important journals and a series of zones each containing the same number



of articles as the nucleus (but each containing many more journals) (Bence, 2004). In addition, Zipf's law (1972) describes the frequency distribution of words in a given text, with familiar words being used many times and many words being used only once. Bradford's and Zipf's laws have been shown to be mathematically identical (Brookes, 1968) and so the distribution is often referred to as Bradford and Zipf distribution.

Mike Thelwall has contributed 213 papers in reputed journals during the study period. To test whether or not his contributions follow Bradford distribution, each zone has around 70 papers. The first two journals account for 71 papers, and first five 113 paper. As 72 is closer to 70, hence 72 papers fall in the first zone. The remaining papers fall in the second and third zones. Zone wise the papers and the journals can be divided as follows (Table 11).

**Table 11 – Distribution of papers and journals according to zones**

Zones	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Papers	72	74	67
Journals	2	7	39

We find from number of journals in the first two zones that the Bradford multiplier is  $7/2=3.5$ . According to this multiplier the number of periodicals in the third zone should be  $2 \times 3.5 \times 3.5 = 24.5$ . Which is the far from the actual number 39. The papers and journals can also be distributed in the three different zones as follows (Table 12).

**Table 12 – Distribution of papers and journals according to zones**

Zones	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Papers	72	79	62
Journals	2	8	38

In this case Bradford multiplier is 3.5. According to this multiplier the number of journals in the third zone should be 35. In reality, it is 38. In both the cases we find that the number of journals in the third zone goes much beyond the actual number. Hence, the data does not strictly follow Bradford law. In any case, in small data sets Bradford distribution is not usually observed.

## Conclusion

We conclude that scientometrics plays an important role in the dissemination of a particular author/scientist whose interest lies in the number of important papers he or she has

published. This study has clearly demonstrated that list of publications of a successful scientist can be analysed scientometrically and it can highlight the various aspects of the career of a scientist such as his productivity according to his biological age, collaborative pattern, and authorship status rise and fall in the productivity curve, channel-wise scattering of publications and other characteristics. It will be very interesting if one attempts to study the sociological aspects and citation studies on Mike Thelwall which may give many new insights into his scientific career. Regularly, these types of studies may prove to be of great value to the concerned scientist, and might help him to pinpoint his position amongst his fellow professionals. However, organised efforts are necessary in the research on individual scientists.

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