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REFERENCING PATTERN IN SCHOLARLY PUBLICATIONS: WITH SPECIAL REFERENCE TO THE RESEARCHERS OF CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

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Abstract

Research productivity is a measure to assess the efficacy of research processes with respect to the two parameters namely quantity and quality. The quality of research productivity is based on various parameters such as the impact of the publications that is measured in terms of citations, the impact factor of the journals where the papers are published, the references and the referencing pattern of the publications. The main aim of this paper is to analyse the referencing pattern of researchers of Christian Medical College (CMC), Vellore. The findings of the study show that the average number of references to a research paper by researchers of CMC, Vellore is 6. As regards to the referencing pattern, it is found that the percentage of references to current 5 years period is 33.1%. That is, nearly one third of the references appended to the research papers published by researchers of CMC, Vellore belong to the recent current five years.

KEYWORDS

Research Productivity, Bibliometrics, Referencing Pattern, Price Index, Recency Effect, Relative Growth Rate and Doubling Time.

Introduction

Research productivity is a measure to assess the efficacy of research processes with respect to the two parameters namely quantity and quality. That is, research productivity is measured in terms of quantity of research output, quality of research contributions, and impact of research insights. Any data that is used to make inferences about the value of research being generated constitutes a measure of research productivity. The quantity of research output refers to the number of publications. The quality of research productivity is based on various parameters such as the impact of the publications that is measured in terms of citations, the impact factor of the journals where the papers are published, the references and the referencing pattern of the publications.

One of the factors that reveal the quality of a research paper is the references appended at the end of the paper. While writing a research paper, the scholar consults various scholarly communications in his area of research and lists them at the end of the research report. This

process is called referencing. Referencing is used to tell audience the sources from where ideas have been got and used in a research paper. There are many reasons why it is important to provide the reference sources. References

- help avoid plagiarism by making it clear which ideas are the researchers own and which are someone else's
- show the researchers understanding of the topic
- give supporting evidence for the researchers ideas, arguments and opinions
- allow others to identify the sources you have used.

The sheer amount of bibliographical references provides a handy measure of social linkage. "I would not like to push this point too hard by claiming, for example, that all papers with a dozen bibliographical references were more scholarly than all those with only 10. Nor would I dream of maintaining that all papers with 10 references were of similar scholarliness (Price, 1986). That is, according to Price, mere number of references cannot be treated as a parameter to evaluate the quality of a research paper. In order to assess whether Price is right or wrong, an attempt has been made to analyse the referencing pattern of researchersof ChristianMedical College, Vellore. The bibliometric indicators such as the age, immediacy effect of the references and the citations of the papers having references.

Review of Literature

Yitzhaki and Ben-Tamar.(1991) studied large samples of papers published in the Journal of Biological Chemistry in all decades and in some mid-decades were checked in order to study the referencing pattern, throughout the period 1910–1985, in an internationally leading journal, with especially high "citation impact". All measures show that there has been a significant growth in the number of references per paper, during most of the period, but mainly from the 1950's on,

Pandita (2013) analysed the papers of Annals of Library and Information studies from 2002 to 2012 and reported that each article has an average of 17.11 references attributed to it, with co-authorship contributing 65.81% of the articles.

Lisee et al. (2008) collected all references from papers in the WoS indexed journals, from 1980 to 2005, and counted how many of those references were to papers published in proceedings. Overall, only 1.7% of the Natural Sciences and Engineering references were to proceedings, and 2.5% for the Social Sciences and Humanities, and these proportions were decreasing in time.

Price (1963) studied the percentage of references to works published in the most recent five year period known as Price's Index.He attributed the citation of recent papers to "Immediacy effect" due to the citation of ephemeral papers at the research front.

Materials and Methods

The methodology used is similar to other bibliometric studies. The number of published articles was considered as an index of quantity of research productivity. The uniqueness of this research is the application of bibliometric tools for the references appended to research articles in Bioinformatics. For the purposes of our study data has been downloaded from Scopus database for the period from 2011 to 2023.

Results and Discussion

Table 1: Research productivity of CMC, Vellore during 2011 to 2023

Year	Publications	Percent
2011	329	4.26
2012	431	5.58
2013	479	6.20
2014	604	7.81

2015	509	6.58
2016	589	7.62
2017	579	7.49
2018	570	7.37
2019	600	7.76
2020	629	8.14
2021	915	11.84
2022	782	10.12
2023	714	9.24
Total	**7730**	**100.00**

Table 1 shows the trend of research productivity by researchers of CMC, Vellore. From the year 2011 onwards, there is a gradual growth in the number of publications. This growth is not uniform during the study period. From 2011 to 2014 there is gradual growth and then in 2015, there is decline. From 2018 to 2021 there is gradual growth and in 2022 there is sudden decline. The highest number of publications is in the year 2021.

Table 2: Research productivity of CMC, Vellore – Relative growth rate and doubling time

Year	Publications	Percent	Growth rate
2011	329	4.26	
2012	431	5.58	0.31
2013	479	6.20	0.11
2014	604	7.81	0.26
2015	509	6.58	-0.16
2016	589	7.62	0.16
2017	579	7.49	-0.02
2018	570	7.37	-0.02
2019	600	7.76	0.05
2020	629	8.14	0.05
2021	915	11.84	0.45
2022	782	10.12	-0.15
2023	714	9.24	-0.09
Total	**7730**	**100.00**	

Table 2 shows the growth of publications by researchers of CMC, Vellore. Though there is gradual growth during the 13 years period, there is also negative growth in the years 2015, 2017, 2018, 2022 and 2023. The average growth rate is 0.08. Hence it is essential to find the doubling time of research productivity.

If d is the doubling-time of a quantity (the amount of time it takes a quantity to double in size) and P is the initial amount of the quantity, then the amount of the quantity present after t units of time is given by $A(t) = P(2)\ t/\ d$, noting that our period is d units of time, so the growth rate per period is 100% and the number of periods at time t is t /d. Using this, the value of d can be calculated using the formula $d = t\log(2)/(\log(A)–\log(p))$

In the present calculation t = 13; A = 714 and P = 329

Hence the doubling time d = 13 x log (2)/ (log (714) – log (329))

= 13 x 0.693/ 6.57 – 5.8

= 9.01/ 1.13

Doubling time d = 7.97

That is, the research productivity by CMC, Vellore will double in 7.97 years or simply 8 years.

Table 3: Distribution of publications by number of references

References	Publications	Percent
0	294	3.80
1	37	0.48
2	80	1.03
3	130	1.68
4	173	2.24
5	289	3.74
6	188	2.43
7	157	2.03
8	204	2.64
9	184	2.38
10	246	3.18
11	178	2.30
12	178	2.30
13	160	2.07
14	186	2.41
15	197	2.55
16	180	2.33
17	172	2.23
18	168	2.17
19	189	2.45
20	192	2.48
21-30	1482	19.17
31-40	951	12.30
41-50	566	7.32
51-100	727	9.40
More than 100	222	2.87
Total	**7730**	**100.00**

A reference is a detailed description of the source of information that a scholar wants to give credit to an earlier study in the form of a citation. The references in research papers are usually in the form of a list at the end of the paper. References:

- demonstrate the foundation of the study.
- support the novelty and value of the study.
- link one study to others creating a web of knowledge that carries meaning.
- allows researchers to identify work as relevant in general and relevant to them.
- create values that are internal to science (e.g., relevance, credit).
- create values that are external to science (e.g., provide avenues to determine accountability and researchers or funding performance).

The more the number of references, the more will be the intellectual capacity of the scholar. The research papers by researchers of CMC, Vellore have zero references to a maximum of 200 references. It is found that 3.80 per cent of the papers do not have references

and 3.74 per cent of the papers have 5 references. As the number of references increases from 0 to 5 the number of papers also increases. From papers having 6 references, the number of publications decreases. Hence it can be inferred that the optimum number of references in a research paper by researchers of CMC, Vellore is 6.

Table 4: Correlation of publications to references

Year	Total Publications	Publications with references	Percent of Publications with references	References	References/paper
2011	329	316	96.05	7111	22.50
2012	431	413	95.82	9521	23.05
2013	479	446	93.11	11538	25.87
2014	604	580	96.03	15615	26.92
2015	509	490	96.27	11989	24.47
2016	589	569	96.60	15439	27.13
2017	579	556	96.03	16253	29.23
2018	570	551	96.67	15105	27.41
2019	600	582	97.00	17586	30.22
2020	629	602	95.71	18143	30.14
2021	915	882	96.39	28615	32.44
2022	782	759	97.06	24129	31.79
2023	714	690	96.64	24494	35.50

Table 4 shows the number of publications and the publications which contain references. From the year 2011 onwards, more than 90 percent of the publications have references. In 2023, the publications with references were found to be the highest (35.50). The average number of references per paper has increased from the year 2011. The correlation between number of publications and number of references is 0.98 showing a positive correlation. That is, the more the number of publications, the more the number of references.

Table 5:Distribution of the references by the year of publications

Year	References	Percent
2023	374	0.18
2022	2120	1.02
2021	5241	2.51
2020	8806	4.22
2019	6943	3.33
2018	7975	3.82
2017	8947	4.29
2016	9255	4.44
2015	9601	4.60
2014	11059	5.30
2013	10622	5.09
2012	10746	5.15
2011	10192	4.88
2010	10347	4.96
2009	9349	4.48

2008	8820	4.23
2007	7822	3.75
2006	7539	3.61
2005	6545	3.14
2004	6150	2.95
2003	5401	2.59
2002	4747	2.27
2001	4212	2.02
2000	3826	1.83
1951-1999	31409	15.05
1901-1950	530	0.25
Before 1901	101	0.05
Total	**208679**	**100.00**

Table 5 lists the year of publication of the references appended to the research papers by researchers of CMC, Vellore. It is found that the highest number of references belongs to the year 2014 (5.30%) followed by 2012 (5.15%) and 2013 (6.09%). Since the year of publication varies, it is necessary to analyse whether the researchers of CMC, Vellore refer current papers or not. In order to assess this, a new variable age of the references is introduced. Age of the references is = Year of publication of the paper – Year of publication of the referred paper.

Table 6: Recency effect and Age of the references

Age	References	Percent
0	4813	2.31
1	14715	7.05
2	17860	8.56
3	16693	8.00
4	15127	7.25
5	14071	6.74
6	12726	6.10
7	11623	5.57
8	10361	4.97
9	9410	4.51
10	8356	4.00
11	7530	3.61
12	6852	3.28
13	6140	2.94
14	5515	2.64
15	4850	2.32
16	4421	2.12
17	4007	1.92
18	3396	1.63
19	3011	1.44
20	2648	1.27

More than 20 years	24554	11.77
Total	**208679**	**100.00**

The recency effect refers to the finding that people tend to have a better memory for information they were told more recently. The recency effect is a cognitive bias that refers to the tendency for people to better remember and place more emphasis on the most recent information they have encountered, compared to earlier information. This means that when given a list of items or information to remember, people are more likely to recall the items that were presented last than those presented earlier. It is found that 2.03 per cent of the references belong to the current year and 7.05 per cent belong to the previous year. An application of Price index (references belonging to current 5 years) shows that the Price index is 33.17%.

Conclusion

Referencing is used in the academic community to indicate where ideas, theories, quotes, facts and any other evidence and information used to support the research. Because of the level of authority and credibility evident in scholarly sources, they contribute a great deal to the overall quality of the research papers. As discussed in this paper, the average number of references to a research paper by researchers of CMC, Vellore is 6. As regards to the referencing pattern, it is found that the percentage of references to current 5 years period is 33.1%. That is, nearly one third of the references appended to the research papers published by researchers of CMC, Vellore belong to current five years and hence the Price index calculated in this research is 33.1

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