Research Productivity of Prof. Sunilkumar S. Manvi: A Scientometric Portrait

B. Vasantha[1] and M. Sangeetha[2]
[1]Deputy Librarian, [2]Assistant Librarian,
Central Library, REVA University, Bangalore, Karnataka, India
E-mail: vasantha02@gmail.com, sangeethakanalli@gmail.com

Abstract - **This paper attempts to scrutinise the publication productivity of Prof. Sunilkumar S. Manvi, Dean of Engineering and Technology at REVA University, Bengaluru, by data obtained from Scopus, Web of Science, and Google Scholar databases. In a total of 24 productive years (1999–2022), he has 292 publications (September 2022), and the highest number of documents was published in the year 2011 with 33 publications. His publications were analysed by types of document, year-wise distribution, distribution of articles in different domains, citation productivity, authorship pattern, measure of collaborations, collaboration indices, most prolific journals with number publication, highly cited articles, and citations during the study period of 1999-2022. As per collaboration indices, his highest Collaborative Coefficient is 0.67, MCC is 1.00 in the year 1999 and 2000 respectively. The highest Degree of Collaboration is 1.00, Collaborative Index is 3.11 in the year 2007. He published 98 documents during the period of 2009–2013. His major contributions to the field of Computer Science and Engineering are numerous.**
Keywords: **Scientometrics, Publication Productivity, Research Collaboration, Scopus, Web of Science, Citation Analysis, Collaboration Indices, Google Scholar, Citation Database**

I. INTRODUCTION

Today, we are living in the technological era; many universities are progressively connected with others to build global networks for knowledge and resource sharing. Investing in research contributes to the prosperity of a nation and the well-being of its citizens. Universities are key contributors to the growth of governments and industries worldwide.

Scientific research evaluation is a difficult process that can be made easier by measuring it in an indirect manner with metrics based on the estimated production of researchers and institutions, which subtly implies productivity.

Among the different metrics, scientometric is the most interesting subject area in the field of library and information science. It helps to measure research activity. Scientometrics is a Russian word coined by Nalimo and Mulchenko in 1969 to evaluate scientific publications' research output in any field of knowledge. They defined scientometrics as a research area for the investigation of sciences viewed as an information process by the application of quantitative methods.

Scientometrics tools are used to collate and compare scientific activities of any institution, author, country, funding agency, and any aspect of a subject and different aspects of their publishing server. Scientometrics is also used for giving, mapping scientific networks, intellectual structure, and watching the development of scientific fields and devices. Scientometrics also empirically explores the constantly changing relationship between science, technology, and research productivity. In the present day, scientometrics work is based on Derek J. de Sola Price and Eguien Garfield's Principles.

Thus, we can say that scientometrics deals with the quantifiable and qualitative characteristics of science and scientific research. One of the major areas of this study is to use mathematical statistical theories to investigate the development and mechanisms of scientific literature in the concerned field.

Through the study of scientometrics, policymakers are also helping to create programming settings in research activities, make decisions in research areas and library activities, as well as prioritise funding agencies, etc.

Scientometrics deals with the following parameters.

1. To learn about the document or form-wise distribution.
2. To investigate the individual author's productivity.
3. To depict the collaborative authors' research publications.
4. To examine the geographical distribution.
5. To find the individual country's output.
6. To analyse the language-wise distributions.
7. To evaluate the organization-wise distribution of research output.
8. To identify the distribution of citations in association with the subject, author, language, etc.
9. To measure the library collection and management, etc.
10. To predict the publications trends, and
11. To scrutinize core journals in a particular domain.

A. Brief Biography of Prof. Sunilkumar S. Manvi

Sunilkumar S. Manvi earned his bachelor's degree in engineering from Karnataka University, his master's degree in engineering in electronics from the University of Visweshwariah College of Engineering in Bangalore, and his doctorate in electrical communication engineering from the Indian Institute of Science in Bangalore, all in India. He has extensive knowledge from more than 30 years of research and teaching. He currently serves as REVA University's Dean of Engineering and Technology.

He has worked in various capacities such as Head of Department in BEC Bagalkot and BLDEACET Bijapur, Head of Department in ECE/ISE/CSE in REVA ITM, Principal of Engineering Institution REVA ITM, Director of School of CSE in REVA University. His areas of interest in research include software agent-based network management, wireless networks, multimedia networking, underwater networks, wireless network security, grid computing, and cloud computing.

He has supervised 70 B.Tech, 40 M.Tech, and 20 PhD projects. He holds memberships in ACM USA, Fellow IETE India, Fellow IE India, Senior Member IEEE USA, and Fellow IETE. 2014 saw him win the VGST Karnataka award for best research article. His remarkable contribution to the field of engineering sciences in 2016 earned him the "SathishDhawan Young Engineers State Award" from DST Karnataka, India.

He serves on the program committees and reviews articles for numerous journals and conferences, including IEEE, Elsevier, Springer, IET, and many others. He has executed funded projects worth Rs. 1.50 crores in areas of wireless networks and healthcare. He has organized many national and international conferences and workshops. He has presented more than 70 invited talks. He has helped several universities for curriculum design. He has been a committee member of local inquiry committee for inspecting university affiliated colleges.

II. OBJECTIVES OF THE STUDY

Prof. Sunilkumar S. Manvi publications during the year 1999-2022 have been taken as a case study for the current scientometric analysis. The study emphasizes on

1. To find the types of publications published by Prof. Sunilkumar S. Manvi.
2. To find year wise productivity of Prof. Sunilkumar S. Manvi.
3. To find the distribution of articles in different domains.
4. To evaluate citation productivity.
5. To analyze the authorship pattern and quinquennial publications.
6. To measure the collaboration and collaboration co-efficiency.
7. To find the most prolific journals with number of publications.
8. To find highly cited articles and their FWCI.

III. METHODOLOGY

The research data was obtained from Scopus, Web of Science, and Google Scholar databases (as on September 26, 2022) and also personally collected from Prof. Sunilkumar S. Manvi to collect data, compared all the databases, removed the duplicate titles, and only 292 publications were taken for analysis. Microsoft Excel was used for data analysis, and we also used the Journal Citation Report (JCR) to know the impact factor of the journals.

IV. RESULT OF DATA ANALYSIS

A. Type of Document

Prof. Sunilkumar S. Manvi has published 292 publications, including conference papers, books, book chapters, articles, reviews, and editorials. Figure 1 shows the partition of different document types. He has contributed to extremely in his field, i.e., 138 (47%) are in articles/reviews, followed by 122(42%) of conference papers, 26 (9%) books of chapters, 4 (1%) of books, and 2 (1%) of editorials.
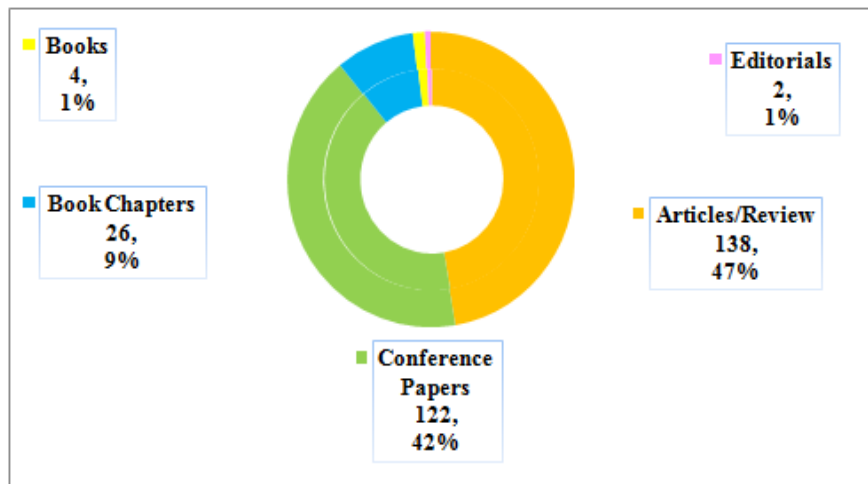

Fig. 1 Type of Documents

B. Year-Wise Publications

Figure 2 shows the year-wise publications of Prof. Sunilkumar S. Manvi as of September 26, 2022, he has 292 publications. The highest number of documents was published in the year 2011, with 33 publications. Since 2005, seven or more than seven publications are contributed per annum.
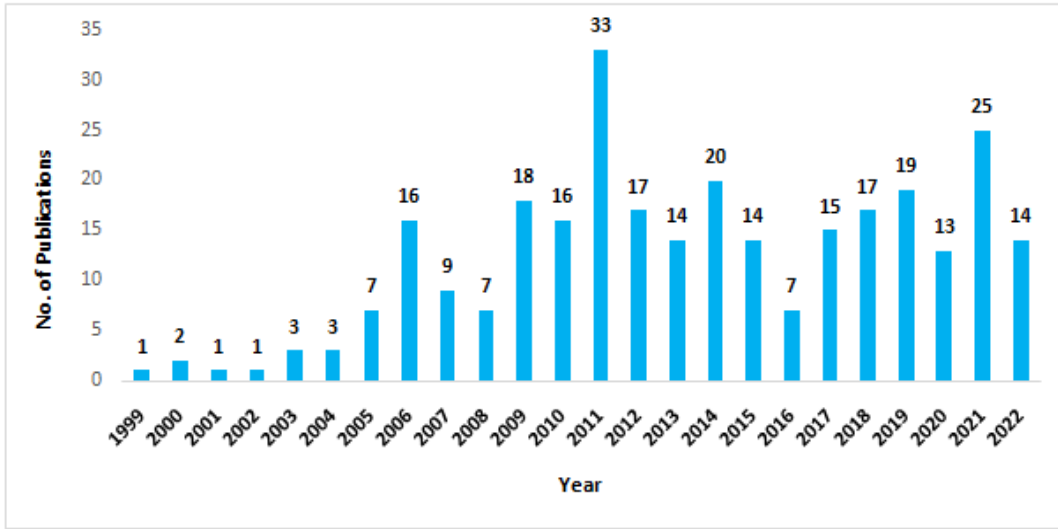

Fig. 2 Year-wise Publications

C. Domain-Wise Publications

The below mentioned figure 3 shows the domain-wise publications. He has highest publications in the field of Computer Science (46.0%) followed by Engineering (26.10 %) Mathematics (8.20%), Physics and Astronomy (3.70%), Decision Science (3.10%), Environment Science (2.60 %), Energy (2.30 %), Social Science (2.30 %), Medicine (2 %) and Business and Management (1.70 %).
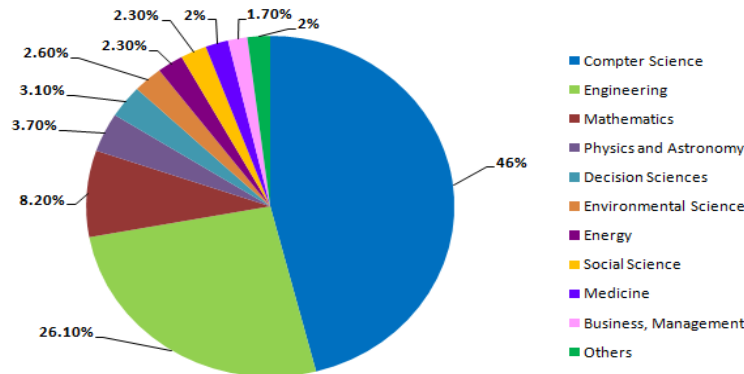

Fig. 3 Domain-wise Publications

D. Citation Productivity- Scopus, Google Scholar and Web of Science

The below mentioned Table I represents the citations and h-index, which were collected from three different databases. Scopus has 2518 citations with a 22 h-index, followed by the Web of Science with 1443 citations and a 17 h-index. Google Scholar has 4361 citations with a 28 h-index for his publications. and Figures 4, 5, & 6 show year-wise citations during the years 1999-2022. As per Scopus and Web of Science, the highest citation was in the year 2019 i.e., 326 &178 citations, Respectively. Following Google Scholar, The highest was in the year 2021 with 538 citations.

TABLE I CITATION PRODUCTIVITY

Citation Source	Citations	h-index
Scopus	2518	22
Web of Science	1443	17
Google Scholar	4361	28
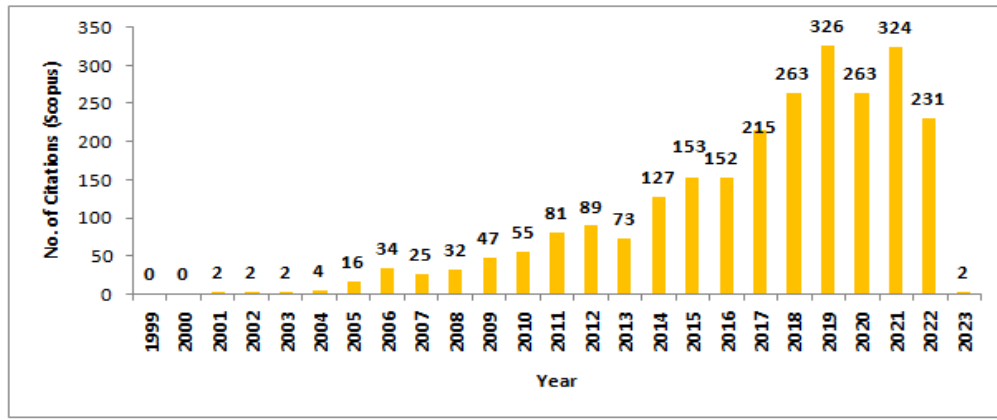
Fig. 4 Year-wise Citation -Scopus
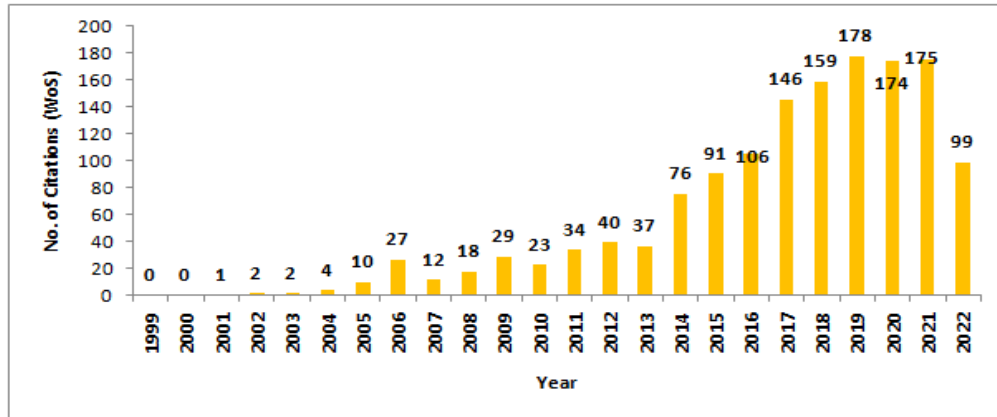
Fig. 5 Year-wise Citations - Web of Science
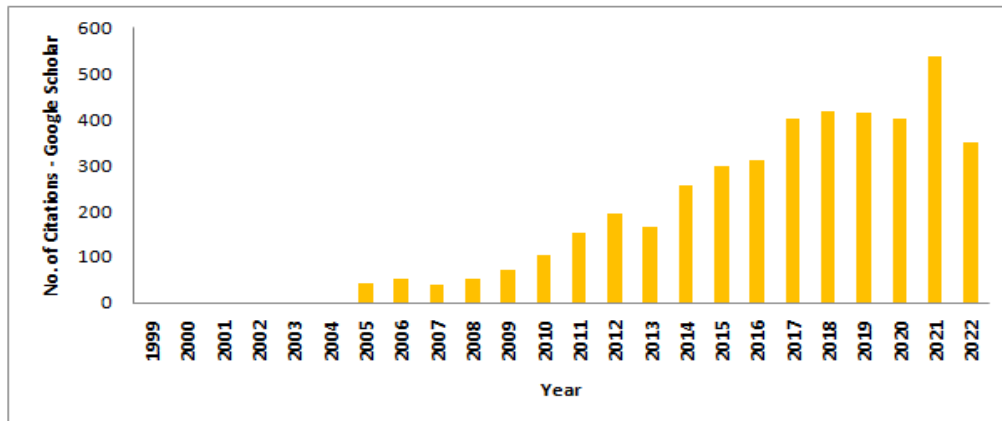
Fig. 6 Year-wise Citations–Google Scholar

E. Authorship Pattern

The below mentioned Table II represents the authorship pattern of Prof. Sunilkumar S. Manvi. Of his total publications, only two papers were published as a single author. With two collaborators, he has published 155 (53.08%) documents.

With three collaborators, he has published 104 (35.62%) documents. With four, 27 (9.25 %), with five, 3 (1.03%), and only 1 (0.34%) document was published with more than five collaborators.

TABLE II AUTHORSHIP PATTERN

Authorship	Number of Articles	Percentage
Single Author	2	0.68
Double Author	155	53.08
Three Authors	104	35.62
Four Authors	27	9.25
Five Authors	3	1.03
More than Five Authors	1	0.34
Total	292	100.00

B. Vasantha and M. Sangeetha

F. Authorship Pattern and Multi-Author Index

He started his authorship by publishing his first paper at the age of 33 in the year 1999. Without any collaboration during his research productivity career, he has contributed 2 (0.68%) publications, the remaining 290 publications (99.32%) with collaboration productivity. The 33 publications represent the highest number of collaborative publications in the year 2011. Among those, with 17 papers, are 2 author's publications. During the 1992–2022 study periods, The Multi-Authored Index value ranged between 0.86 and 1.01.

TABLE III AUTHORSHIP PATTERN AND MULTI-AUTHOR INDEX

Biological Age of Prof. Sunilkumar S. Manvi	Year	Number of papers Under various authorships						TMA	TP	CP	MAI	Publication Age
		1	2	3	4	5	>5					
33	1999	0	0	1	0			1	1	1	1.01	1
34	2000	0	2	0	0			2	2	3	1.01	2
35	2001	0	1	0	0			1	1	4	1.01	3
36	2002	0	1	0	0			1	1	5	1.01	4
37	2003	0	3	0	0			3	3	8	1.01	5
38	2004	0	2	1	0			3	3	11	1.01	6
39	2005	0	3	4	0			7	7	18	1.01	7
40	2006	0	7	8	1			16	16	34	1.01	8
41	2007	0	2	4	3			9	9	43	1.01	9
42	2008	0	4	3	0			7	7	50	1.01	10
43	2009	0	8	10	0			18	18	68	1.01	11
44	2010	0	6	7	2	1		16	16	84	1.01	12
45	2011	0	17	12	4			33	33	117	1.01	13
46	2012	0	11	3	2	1		17	17	134	1.01	14
47	2013	0	6	8	0			14	14	148	1.01	15
48	2014	0	16	3	1			20	20	168	1.01	16
49	2015	0	9	5	0			14	14	182	1.01	17
50	2016	1	4	1	1			6	7	189	0.86	18
51	2017	0	7	8	0			15	15	204	1.01	19
52	2018	1	7	7	2			16	17	221	0.95	20
53	2019	0	12	3	4			19	19	240	1.01	21
54	2020	0	8	5	0			13	13	253	1.01	22
55	2021	0	12	7	5		1	25	25	278	1.01	23
56	2022	0	7	4	2	1		14	14	292	1.01	24
	Total	2						290	292			
	%	0.68						99.32	100			

TMA-Total Multi Authored Publications TP- Total Publications CP- Cumulative Publications MAI- Multi-Authored Index

G. Quinquennial Publications

TABLE IV QUINQUENNIAL PUBLICATIONS OF PROF. SUNILKUMAR S. MANVI

Sl. No.	Years	SAP	Cumulative (SAP)	% of SAP	MAP	Cumulative (MAP)	% of MAP	TP	Cumulative (TP)	% of TP
1	1999-2003	0	0	0	8	8	2.8	8	8	2.7
2	2004-2008	0	0	0	42	50	14.5	42	50	14.4
3	2009-2013	0	0	0	98	148	33.8	98	148	33.6
4	2014-2018	2	2	100	71	219	24.5	73	221	25.0
5	2019-2022	0	2	0	71	290	24.5	71	292	24.3
	Total	2		100	290		100			100

TP-Total Publications, SAP-Single Authored Publications, MAP -Multi Authored Publications
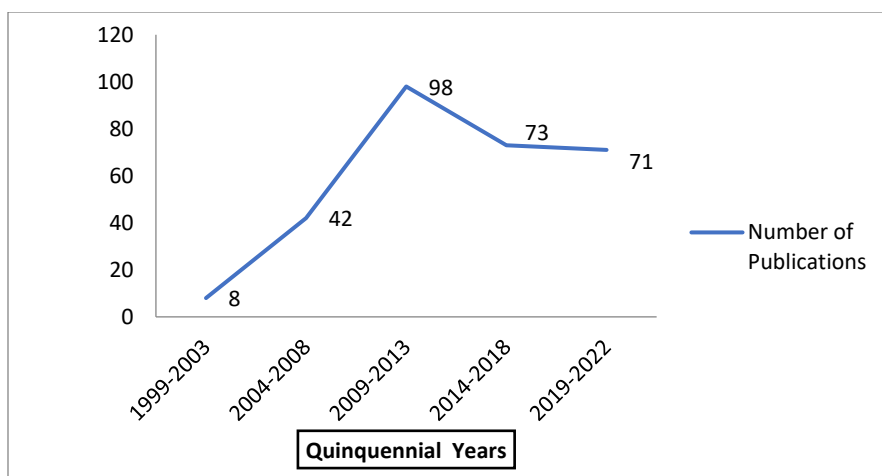
Fig. 7 Quinquennial Year-wise Publications

Table IV and Figure 7 represent the number of publications he has contributed during the five years. 98 (33.6 %) documents were published during the years of 2009-2013.

H. Measure of Collaboration

Table V represents four collaboration indices. They are the Collaborative Index, Degree of Collaboration, Collaborative Coefficient, and Modified Collaboration Coefficient. The highest collaborative index (CI) given is 3.11 in the year 2007, followed by 3.00 in 1999, and the lowest CI is 2.00, which can be seen in the years 2000-2003. The highest degree of collaboration is 1.00 in his career age, sequentially 0.94 in 2018. The lowest DC was 0.86 in the year 2016. DC 1.00 specifies that there are no single-author publications. The collaborative coefficient (CC) is the difference between the levels of authorship pattern and a measure of collaborative research. The highest value of the Collaborative Coefficient was 0.67 in 1999, followed by 0.66 in 2007, and the lowest collaboration coefficient was CC 0.49 in 2016. The highest modified Collaboration Coefficient (MCC) value was 1.00 in 2000, followed by 0.83 in 2004 and 0.75 in 2003, with the lowest MCC count being 0.57 in 2014 and 2016.

TABLE V MEASURE OF COLLABORATION

Years	Single Author	2 Author	3 Author	4 Author	5 Author	More than >Five	Total Publications	Collaborative Index	Degree of Collaboration	Collaborative Coefficient	Modified Collaborative Coefficient
1999	0	0	1	0			1	3.00	1.00	0.67	0
2000	0	2	0	0			2	2.00	1.00	0.50	1.00
2001	0	1	0	0			1	2.00	1.00	0.50	0
2002	0	1	0	0			1	2.00	1.00	0.50	0
2003	0	3	0	0			3	2.00	1.00	0.50	0.75
2004	0	2	1	0			3	2.33	1.00	0.56	0.83
2005	0	3	4	0			7	2.57	1.00	0.60	0.69
2006	0	7	8	1			16	2.63	1.00	0.60	0.64
2007	0	2	4	3			9	3.11	1.00	0.66	0.74
2008	0	4	3	0			7	2.43	1.00	0.57	0.67
2009	0	8	10	0			18	2.56	1.00	0.59	0.63
2010	0	6	7	2	1		16	2.88	1.00	0.62	0.66
2011	0	17	12	4			33	2.61	1.00	0.59	0.61
2012	0	11	3	2	1		17	2.59	1.00	0.58	0.61
2013	0	6	8	0			14	2.57	1.00	0.60	0.64
2014	0	16	3	1			20	2.25	1.00	0.54	0.57

2015	0	9	5	0			14	2.36	1.00	0.56	0.60
2016	1	4	1	1			7	2.29	0.86	0.49	0.57
2017	0	7	8	0			15	2.53	1.00	0.59	0.63
2018	1	7	7	2			17	2.59	0.94	0.57	0.60
2019	0	12	3	4			19	2.58	1.00	0.58	0.61
2020	0	8	5	0			13	2.38	1.00	0.56	0.61
2021	0	12	7	5		1	25	2.84	1.00	0.61	0.63
2022	0	7	4	2	1		14	2.79	1.00	0.60	0.65
Total							292				

I. Channels for Publishing the Documents

The Table VI represented the different 23 Channels for publishing the documents. out of the 23 The journal of Network and Application has the highest 8 publications with a 1.58 impact factor, followed by Wireless Personal Communications and Communications in Computer and Science having the 6 publications and more than three articles were published in different nineteen journals and conference proceedings.

TABLE VI SOURCE OF CHANNELS

Rank	Source Titles	Number of Publications	Cumulative Publications	Impact Factor
1	Journal of Network and Computer Applications	8	8	1.58
2	Communications in Computer and Information Science	6	14	Nil
3	Wireless Personal Communications	6	20	0.43
4	International Conference of IEEE Region 10 Proceedings/TENCON	5	25	Nil
5	International Journal of Computer and Electrical Engineering	5	30	0.99
6	ICCSP stands for International Conference on Communication and Signal Processing.	4	34	Nil
7	International Journal of Advanced Networking and Applications	4	38	Nil
8	Journal of Engineering and Advanced Technology International	4	42	Nil
9	Telecommunications and Information Technology	4	46	Nil
10	Multiagent And Grid Systems	4	50	0.21
11	ICFCC	4	54	Nil
12	The International Conference on Smart Technology for Smart Nations Proceedings Con Tech Smart	4	58	Nil
13	IEEE International Advance Computing Conference IACC Souvenir	4	62	Nil
14	Recent Developments in Research Supported by Computational Intelligence: Theoretical Foundations and Applications	3	65	Nil
15	Recent Trends in Electronics, Information and Communication Technology: Proceedings of the IEEE International Conference	3	68	Nil
16	ICACCI	3	71	Nil
17	ICECT	3	74	Nil
18	IET Seminar Digest	3	77	Nil
19	IETE Technical Review	3	80	0.4
20	Advanced Computer Science Research International Journal	3	83	Nil
21	ICAECC	3	86	Nil
22	Statistical Modelling and Machine Learning Principles For Bioinformatics	3	89	Nil
23	CONECCT	3	92	Nil
24	Other Journals With 2 Publication	54	146	
25	Other Journals With 1 Publication	146	292	

J. Highly Cited Publications

For his 292 publications, he received 2518 citations from Scopus, 1443 citations from the Web of Science, and 4361 citations from Google Scholar as of September 2022. The below tables 7, 8, and 9 show the five most cited publication from these three databases. The publication titles "Resource management for Infrastructure as a Service (IaaS) in cloud computing: A survey" and "A survey on authentication schemes in VANETs for secured communication" are commonly cited from these three databases.

TABLE VII HIGHLY CITED PUBLICATIONS (SCOPUS)

Sl. No.	Publication Titles	Type of Document	Citations	FWCI
1	Resource management for Infrastructure as a Service (IaaS) in cloud computing: A survey by Manvi, S S & Shyam Journal of network and computer applications, 41, 424-440, 2014.	Review	412	8.65
2	A survey on authentication schemes in VANETs for secured communication by Manvi, S S & Tangade, S Vehicular Communications, 9, 19-30. 2017.	Review	198	4.53
3	Smart waste management using Internet-of-Things (IoT) by Shyam, G K, Manvi, S S & Bharti, P. In 2017 2nd international conference on computing and communications technologies (ICCCT) (pp. 199-203), 2017.	Conference Paper	99	13.88
4	Applications of agent technology in communications: a review by Manvi, S S & Venkataram, P Computer communications, 27(15), 1493-1508. 2004.	Review/Articles	98	5.05
5	Information management in vehicular ad hoc networks: A review by Kakkasageri, M. S & Manvi, S S Journal of network and computer applications, 39, 334-350, 2014.	Review	89	2.37

*FWCI-Field Weighted Citation Impact

TABLE VIII HIGHLY CITED PUBLICATIONS (WEB OF SCIENCE)

Sl. No.	Publication Titles	Type of Document	Citations
1	Resource management for Infrastructure as a Service (IaaS) in cloud computing: A survey by Manvi, S S & Shyam Journal of network and computer applications, 41, 424-440, 2014.	Review	312
2	A survey on authentication schemes in VANETs for secured communication by Manvi, S S & Tangade, S Vehicular Communications, 9, 19-30. 2017.	Review	168
3	Applications of agent technology in communications: a review by Manvi, S S & Venkataram, P Computer communications, 27(15), 1493-1508. 2004.	Review	77
4	Information management in vehicular ad hoc networks: A review by Kakkasageri, M. S & Manvi, S S Journal of network and computer applications, 39, 334-350, 2014.	Review/Articles	63
5	Review of multicast routing mechanisms in mobile ad hoc networks by Biradar, R C & Manvi, S S, Journal of Network and Computer Applications, 35(1), 221-239, 2012.	Review	48

TABLE IX HIGHLY CITED PUBLICATIONS (GOOGLE SCHOLAR)

Sl. No.	Publication Titles	Type of Documents	Citations
1	Resource management for Infrastructure as a Service (IaaS) in cloud computing: A survey by Manvi, S S & Shyam Journal of network and computer applications, 41, 424-440, 2014.	Review	645
2	A survey on authentication schemes in VANETs for secured communication by Manvi, S S & Tangade, S Vehicular Communications, 9, 19-30. 2017.	Review	256
3	Smart waste management using Internet-of-Things (IoT) by Shyam, G. K., Manvi, S. S., & Bharti, P in International conference on computing and communications technologies (ICCCT) (pp. 199-203). IEEE, 2017.	Conference Paper	172
4	Applications of agent technology in communications: a review by Manvi, S S & Venkataram, P Computer communications, 27(15), 1493-1508. 2004.	Review/Articles	162
5	Issues in underwater acoustic sensor networks by Manjula, R B & Manvi, S S in International Journal of Computer and Electrical Engineering, 3(1), 101, 2011.	Article	133

VI. CONCLUSION

It is realised that individuals are the sources of ideas. The lives of individuals and the works of individuals stimulate the younger generation to emulate them. The present study is an attempt to gain an insight into the scholarly journey of Prof. Sunilkumar S. Manvi as a researcher. He has been active in research despite his many academic responsibilities. He has collaborated with more than 100 authors, and the degree of collaboration is 0.99, indicating extensive collaboration with other researchers. According to Google Scholar, it has the most citations (4361) and the highest h-index (28), followed by Scopus (2518 citations and 22 h-index) and Web of Science (1443 citations and 17 h-index). The high rate of citation to his papers proves the usefulness and impact of his scientific works in is field.

ACKNOWLEDGMENT

B. Vasantha and M. Sangeetha

REFERENCES

[1] Ajiferuke, I., Burell, Q., & Tague, J. (1988). Collaborative coefficient: A single measure of the degree of collaboration in research. *Scientometrics*, *14*(5-6), 421-433.

[2] Balutagi, S., Huded, S. M., & Devi, K. N. (2020). Measuring research contributions of prof. Anurag Kumar: a scientometric analysis. *Library Philosophy and Practice (e-journal)*, 1-26.

[3] Dixit, Gopal Prasad & Jange Suresh. (2018) The Scientometric Portrait of Prof. S. R. Niranjana. *International Journal of Library Science and Research,* 8 (3), 13-20.

[4] Kavi, P., Chandrashekara, M., Byrappa, A., & Jayakanth, F. (2021). Scientometric Portrait of Prof.Dipankar Das Sarma, Solid State & Structural Chemistry Unit, Indian Institute of Science, Bengaluru. *Library Philosophy and Practice*, *4*(30), 1-21.

[5] Panneerselvam, P., & Saravanan, G. (2013). Scientometric analysis of research publication of BS Abdur Rahman University: A study based on web of science. *SALIS Journal of Information Management and Technology*, *4*(2), 13-20.

[6] Viswanathan, V., Elango, B., & Yugapriya, S. (2019). Authorship trends in telemedicine research. *Int. J. Recent Technol. Eng*, *8*(2), 3030-3036.

[7] Yadav, S. K., Singh, S. N., & Verma, M. K. (2019). Authorship and collaboration pattern in SRELS journal of information management during 2008-2017: An evaluation. *Library Philosophy and Practice*, 1-14.