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RESEARCH PRODUCTIVITY OF MAHARSHI DAYANAND UNIVERSITY (MDU) : A QUANTITATIVE APPROACH

Dinesh Kumari[1*], Neelam Malik[1*] & Seema Parmar[2*]

[1]BPSITTR, Bhagat Phool Singh Mahila Vishwavidyalaya, Khanpur Kalan, Sonipat,131305 Haryana- India.
[2]Nehru Library, CCSHAU, Hisar 125 004, India.

*Correspondence: mandirakundu@gmail.com, dr.neelammalik11@gmail.com, seemaparmar9@gmail.com

ABSTRACT

Introduction. The present research paper investigate the research productivity of Maharshi Dayanand University, Rohtak from 2011 to 2020.

Research Method. The paper carried out various parameters of bibliometric such as total output and cited publications; year wise distribution of research output; most prolific author, top cited articles of the MDU authors and most preferred source by authors.

Results and Discussion. This study found that the most preferred document form is article with 2426 (71.31%) publications followed by review with 383 (11.26%) publications and most productive year is 2020 (15.20%) followed by 2019 (15.14%) among MDU publications during the study period. The study explored that in terms of number of publications, Pundir, C.S. is most productive author of MDU with 169 publications followed by P.Shukla with 148 contributions. It is also noticed that top fifteen authors collectively produced 37% research output of total publications of MDU . The *Aip Conference Proceedings* contributed highest research output (42) among top ten preferred sources of university and these top ten sources together produced around 8.96% of the total research output. The study found that the article titled *"Nanostructured graphene/Fe3O4 incorporated polyaniline as a high performance shield against electromagnetic pollution"* authored by Singh, K. et al. published in the year 2013 received highest number of citations.

Keywords: Research output; Bibliometric; MDU; Scopus; Top Cited Article.

1. INTRODUCTION

Research is the art of scientific investigation which helps to build knowledge. It is an original addition to the available knowledge for further advancement . In higher education system, It is evident that recognition and acknowledgment are influenced by research. India is increasingly valuing the evaluation and ranking of higher educational systems. Top ranking of higher education institutions show that research output and impact play an important role in the overall performance evaluation of an institutions. Research is considered as one of the main indicators to rate higher education institutions. Publications reflect the research activities of an institution and can be used to help to get a better idea of the institution's research productivity.

In today's world, universities must have credibility.It is becoming more important to identify, review,monitor, and measure the university's research output. One of the most widely used tools for identifying, collating, measuring, analysing, and reviewing the research productivity of individuals or groups, institutions, countries, or organisations, is bibliometrics. Bibliometrics allows for comparisons of research productivity between individuals, groups, institutions, and countries. Many bibliometric and scientific studies have been done to evaluate the research productivity of different disciplines and institutions. Therefore, the current study has been conducted to find out the research output or latest publishing trends of Maharshi Dayanand University, Rohtak through some bibliometric indicators.

1.1 Bibliometric

The word 'Bibliometric' was coined by Pritchard in 1969. It is a combination of two words 'biblio' and 'metrics'. The word 'biblio' is derived from a Latin and Greek Word combination 'biblion', which means book, paper. On the other side the word 'metrics' refers 'measurement'. Bibliometrics is statistical analysis of written publication, such as books or articles. It is a type of research method used in library and information science. Some definitions used for 'Bibliometrics 'are as under:

According to Bellis (2009) "Bibliometric is a set of methods to quantitatively analyze scientific and technological literature."

According to Potter (1981) bibliometrics is "the study and the measurement of the publication pattern of all forms of written communication and their author."

Pritchard (1969) defined it as "the application of mathematics and statistical methods to books and other media of communication".

1.2 Maharshi Dayanand Univesity, Rohtak

Maharshi Dayanand University is a National Assessment and Accreditation Council (NAAC) accrediated 'A'+ grade university, located at Rohtak in the state of Haryana. It was established in 1976 as a residential University. In 1977, It was rechristened as Maharshi Dayanand University after the name of a great visionary and social reformer,Maharshi Dayanand. In 1978, University became an affiliating university and in 1979, it secured recognition from UGC. It has 38 departments to offer educational and research programmes.About 263 academic institutions/colleges are affiliated to this university.Beside, university offers academic programmes through distance mode also.

2. OBJECTIVES

The study has been conducted with taking following objectives in to consideration;

- to identify the form-wise research output of MDU;
- to identify the yearwise research productivity of MDU;
- to identify the most prolific authors of MDU;
- to identify top ten prefrred sources for publications by MDU
- to identify top ten most cited publications of MDU.

3. METHODOLGY

In this present study, research output of Maharshi Dayanand University from 2011 to 2020 has been analyzed. The data has been extracted from the largest abstracting and citation database of peer- reviewed literature which is Scopus database. The data was extracted from the Scopus in August 2021 using the strings "Maharshi Dayanand University" and afterwards followed a few filters. The data was shifted to MS-Excel for analysis and presented in tabular form for further interpretations.The study is limited to the Scopus database covering a ten years study period.

4. REVIEW OF RELATED LITERATURE

For any research, review of related literature serves as a mandate to go ahead with. The reviews entail numerous messages and information further research. Often its serves whether an area is fit to be study for a doctoral work or not. Further from the previous studies, we get to know about the methodology, applied for,

how the data was collected, analyzed and presented.Some studies consulted for this work are presented in this section.

Angadi, *et al.(2012),* studied the research productivity of University of Madras based on Web of Science by collecting publication data for a time period from 1999 to 2011. A total of 3,831 publications were analysed to find out the authorship pattern, most prolific authors, most preferred journals etc. *Siwach & Kumar (2015)* analysed the research output of Maharshi Dayanand University based on Scopus database for a time period 2000-2013.In this study yearly research productivity,collaboration at national and international level,subject-wise analysis, most prolific authors and most preferred journals have been analysed. *Baskaran (2013)* analysed the research output of Alagappa university during 1999-2011.The study explored the author productivity,discipline-wise and institution-wise collaboration of university.The study explored the research output through relative growth rate and doubling time to findout the growth pattern of publications..

A few other studies conducted by Kumbar et al, Mukherjee, Kaur & Mahajan etc. were also consulted for interpretation and analysis of data.

5. DATA ANALYSIS

5.1 Type of publications of MDU during 2011-2020

The table 1 explored that different type of publications are preferred by authors of MDU during the study period. It is apparent that majority of literature was published in form of articles (71.31%) followed by review (11.26%), conference paper (10.17%) and book chapters (4.44%). Other publications were least appeared like editorial , book, letter, data paper, note , survey etc.

Table 1. Types of publications

S.No	Document Type	Publications	%
1	Article	2426	71.31
2	Review	383	11.26
3	Conference Paper	346	10.17
4	Book Chapter	151	4.44
5	Editorial	34	1.00
6	Book	28	0.82
7	Letter	11	0.32
8	Data Paper	8	0.24
9	Erratum	8	0.24
10	Note	5	0.15
11	Short Survey	1	0.03

12	Undefined	1	0.03
Total		**3402**	**100**

5.2 Yearly research productivity of MDU

Table 2 depicts the year wise distribution of MDU publications during the period 2011-2020.Table shows that a total of 3402 records of MDU were observed in Scopus database during the study period . It is very clear from the table that most productive year has been 2020 (15.20%) followed by 2019 (15.14%). The table clearly shows that there is an increasing trend in research productivity of MDU.Table shows that total citation per paper is highest in the year 2011. It shows that the old publications received more citations rather than new publications.

Table 2. Year wise distribution of papers/citations

Year	Publications	%	Total citation	%	TCPP
2011	199	5.85	4245	12.72	21.33
2012	257	7.55	3914	11.73	15.23
2013	294	8.64	4372	13.10	14.87
2014	281	8.26	2964	8.88	10.55
2015	276	8.11	2794	8.37	10.12
2016	349	10.26	3746	11.22	10.73
2017	345	10.14	3379	10.12	9.79
2018	369	10.85	3152	9.44	8.54
2019	515	15.14	2876	8.62	5.58
2020	517	15.20	1936	5.80	3.74
Total	**3402**	**100.0**	**33378**	**100.0**	

5.3 Most prolific authors

The list of fifteen top authors who gave highest contribution during the period 2011-2020 is given in Table 3. In terms of number of publications, Pundir, C.S. is most productive author with 169 publications followed by Shukla, P. with 148 publications . It is also noticed that these fifteen authors collectively produced 37 percent research output of total publications of MDU.

Table 3. Most prolific authors in terms of research publications

S.NO.	Most Prolific Authors	Publications
1	Pundir, C.S.	169
2	Shukla, P.	148
3	Narasimhan, B.	126
4	Gill, S.S.	96
5	Khatkar, S.P.	90
6	Taxak, V.B.	86
7	Dureja, H.	80
8	Chugh, R.	64
9	Narang, J.	63
10	Chhillar, A.K.	60
11	Yadav, J.P.	60
12	Singh, D.	59
13	Tuteja, N.	55
14	Singh, B.	53
15	Chauhan, N.	50
	Total	**1259**
	%	**37.00**

5.4 Top ten preferred sources of MDU

Table 4 lists the top ten sources which are preferred by MDU authors and made highest contribution in terms of research output during 2011-2020. These top ten sources together produced around 8.96% of the total research output. The *Aip Conference Proceedings* contributed highest research output (42) among top ten preferred sources of MDU followed *by Communication And Computing Systems Proceedings of The 2nd International Conference On Communication And Computing Systems Icccs 2018* with 38 publications. It is also found that three sources at position 8th , 9th and 10th produced equal share of research output (23 each).

Table 4. Top ten source of MDU

S.No	Source/Journal	Publications

1	Aip Conference Proceedings	42
2	Communication And Computing Systems Proceedings Of The 2nd International Conference On Communication And Computing Systems Icccs 2018	38
3	International Journal of Biological Macromolecules	37
4	International Journal of Pharmacy And Pharmaceutical Sciences	34
5	Journal of Materials Science Materials In Electronics	34
6	Medicinal Chemistry Research	27
7	BMC Chemistry	24
8	Annals of Biology	23
9	Ceramics International	23
10	Process Biochemistry	23
	Total	**305**
	%	**8.96%**

5.5. Top cited papers of MDU during 2011-2020

Top 10 highly cited papers of MDU during 2011-2020 are listed in table 5.The paper titled *"Nanostructured graphene/Fe3O4 incorporated polyaniline as a high performance shield against electromagnetic pollution"* authored by Singh, K. et al. published in the year 2013 received highest number of citations and the paper at 10th position in receiving highest citations authored by Chauhan, N. & Pundir, C.S. , published in the year 2011 received 151 citations.

Table 5. Top cited papers

Authors	Title	Year	Cited by
Singh, K., Ohlan, A., Pham, V.H., Balasubramaniyan, R.B., Varshney, S., Jang, J., Hur, S.H., Choi, W.M., Kumar, M., Dhawan, S.K., Kong, B.-S., Chung, J.S.	Nanostructured graphene/Fe3O4 incorporated polyaniline as a high performance shield against electromagnetic pollution	2013	413
Gill, S.S., Anjum, N.A., Hasanuzzaman, M., Gill, R.,	Glutathione and glutathione reductase: A boon in disguise for plant abiotic	2013	237

Trivedi, D.K., Ahmad, I., Pereira, E., Tuteja, N.	stress defense operations		
Gill, S.S., Tuteja, N.	Cadmium stress tolerance in crop plants: Probing the role of sulfur	2011	225
Singh, L.P., Gill, S.S., Tuteja, N.	Unraveling the role of fungal symbionts in plant abiotic stress tolerance	2011	213
Pundir, C.S., Chauhan, N.	Acetylcholinesterase inhibition-based biosensors for pesticide determination: A review	2012	186
Dhankhar, R., Hooda, A.	Fungal biosorption-an alternative to meet the challenges of heavy metal pollution in aqueous solutions	2011	176
Narang, R., Narasimhan, B., Sharma, S.	A review on biological activities and chemical synthesis of hydrazide derivatives	2012	159
Dahiya, D.K., Renuka, Puniya, M., Shandilya, U.K., Dhewa, T., Kumar, N., Kumar, S., Puniya, A.K., Shukla, P.	Gut microbiota modulation and its relationship with obesity using prebiotic fibers and probiotics: A review	2017	152
Narasimhan, B., Sharma, D., Kumar, P.	Benzimidazole: A medicinally important heterocyclic moiety	2012	152
Chauhan, N., Pundir, C.S.	An amperometric biosensor based on acetylcholinesterase immobilized onto iron oxide nanoparticles/multi-walled carbon nanotubes modified gold electrode for measurement of organophosphorus insecticides	2011	151
Total			**2064**

6 CONCLUSION

In the present study, the analysis of 3402 records of Maharshi Dayanand University found that there is an increasing growth trend of research publication during the ten years (2011-2020).The document-wise analysis clearly shows that articles which are the units of journals are most preferred form by MDU authors.The study indicates that largest number of articles were published in *AIP conference proceedings* which indicates that authors of MDU preferred conference participation during the study period.Among the most prolific authors,C.S. Pundir observed as top author with the

highest number of publications.The paper with joint authorship entitled "Nanostructured graphene/Fe3O4 incorporated polyaniline as a high performance shield against electromagnetic pollution" published in 2013 observed as the most cited paper with 413 citations.

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