Authorship Productivity and Publication Patterns of the Maharaja Sayajirao University of Baroda: A Web of Science-Based Bibliometric Analysis (2015–2025)

Akshaya Kumar K. S.
Assistant Professor
Dept. of Library and Information Science,
The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India
Email: akshayakumarks@gmail.com

Ranjita Niladri Dash
Assistant Professor,
Dept of Library and Information Science.
The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India
Email: ranjita.n.dash-libsc@msubaroda.ac.in

Abstract

The study evaluates the research output of The Maharaja Sayajirao University of Baroda (MSU) from 2015 to 2025, using Web of Science data. It analyzes publication growth trends, types of documents, preferred subject areas, and authorship productivity, employing Lotka's Law and Subramaniyam's formula for collaboration assessment. MSU has an average citation of 15.7 per publication and an h-index of 80, with 87.14% of publications being scholarly articles. Jha, Prafulla K (Physics) is the most prolific author with 230 publications, while 72% of authors contributed just one publication. The analysis indicates a trend of multi-authored research, with a collaboration index of 0.98, highlighting disciplines like health sciences, environmental studies, materials science, and new technologies as key areas of impact and citation rates.

Keywords

Author productivity; Bibliometrics;Citation Analysis; Degree of Collaboration; Lotka's law; The Maharaja Sayajirao University of Baroda

Electronic access

The journal is available at www.jalis.in
DOI: 10.5281/zenodo.21023797

Journal of Advances in Library and Information Science
ISSN: 2277-2219 Vol. 15. No.3. 2026. pp.355-365

1. Introduction

Bibliometric analysis is a statistical technique used to evaluate and quantify the growth of a subject. Bibliometric techniques are now used to identify various scientific indicators, assess scientific output, select journals for libraries, and predict a field's future research potential. Bibliometric research can be used by any discipline to identify patterns and developments in its literature. Statistical techniques were first used by Cole and Eales in 1917 to count and classify publications by field and place of origin. This study conducted a country-wise analysis based on titles of books, journals, and articles. A study conducted by Hulme in 1922 analysed written communication to identify the nature and evolution of a discipline. The term "Statistical Bibliography" was first coined in this study (Ningayya & Kumar, 2025).

Bibliometric studies serve as an essential decision-making tool for librarians, much like quantitative analysis supports managerial decisions in industrial settings. It provides objective, measurable data that support effective library management and policy formulation. In academic institutions, Bibliometric data also include information on publications, sources, and disciplinary distributions. These datasets, when organized systematically, can be quantified and subjected to statistical analysis, enabling librarians and information professionals to interpret trends and make evidence-based decisions similar to econometric analyses (Nicholas & Ritchie, 1978; Egghe & Rousseau, 1990). The primary purpose of a Bibliometric study is to systematically analyse scholarly communication patterns and research output. It facilitates the identification and classification of different forms of literature, enabling a structured understanding of knowledge production. These studies analyse authorship patterns and collaborative trends across disciplines (Broadus, 1987; Sengupta, 2009). Bibliometrics plays a crucial role in fostering a research-oriented environment by promoting awareness of scholarly communication, citation practices, and research evaluation among faculty members, students, librarians, and researchers. It supports informed planning and strategic decision-making in academic and research institutions. By applying bibliometric techniques, researchers and educators can systematically track developments within their fields, identify influential works, and understand emerging research trends. It also encourages the adoption of advanced analytical approaches within the broader framework of

scientometric and related metric studies (Hood & Wilson, 2001; Thanuskodi, 2010).

Bibliometric methods support the assessment of literature productivity, the identification of core journals and research fronts, the development of indexing systems and thesauri, the formulation of search strategies for automated information retrieval systems, the comparative evaluation of secondary services, bibliographic control, the preparation of retrospective bibliographies, and library management. As a research approach, bibliometrics offers significant strengths, including its quantitative and objective nature, methodological replicability, wide practical applicability, and the use of unobtrusive data derived from published records, ensuring high reliability (Broadus,1987; Hood & Wilson, 2001; Pritchard, 1969).The present study examines the university's research output for the period 2015 to 2025 as reflected in the Web of Science database. Study analyses the year-wise contribution of publications to identify growth trends over the study period, along with the distribution of publications by different types of documents. The study tries to identify the most preferred subject areas and identifies the most productive authors contributing to the research output. Author productivity is also evaluated using Lotka's Law to assess patterns of scholarly contribution. The study also analysed the year-wise distribution of publications based on the number of authors, and calculated the degree of collaboration by applying Subramaniyam's formula.

2. The Maharaja Sayajirao University of Baroda: A Brief Note .

The Maharaja Sayajirao University of Baroda (MSU) is leading educational institutions and centre of research since its inception in 1949. The university has always shown a strong interest in maintaining an environment dedicated to development and advancement of academics. This commitment is deeply embedded in the institution's rich legacy and tradition (MSUB, 2026). His Highness Shrimant Maharaja Sayajirao Gaekwad III established "Baroda College" in 1881. It is one of the oldest educational institutions in Western India. He stated, "The highest and the noblest object of education is not the acquisition of knowledge itself, but the formation of character." To strengthen this vision, the enlightened ruler established Kala Bhavan in 1909. The Maharaja Sayajirao University of Baroda was established as a successor to Baroda College with the passage of a legislative bill on April 30, 1949,

It is a state university with English as the medium of instruction and is recognized by the Government of India under the Indian Universities Act, 1958.and has been assigned Four Star Grade with CGPA of 70.7 in the year 2000 in Cycle 1, B Grade with CGPA of 2.71 in the year 2010 in Cycle 2, Grade A with 3.16 CGPA of 3.16 in the year 2016 in cycle 3 and "**A+" Grade** with **CGPA of 3.43** in the year 2022 in Cycle 4 by National Assessment and Accreditation Council. In line with National Education Policy 2020, the university is poised to embark on a transformative journey aimed at reimagining the learning experience. Initiatives such as the Multiple Entry –exit system and integrated Degree programmes are initiated to revolutionise the way students engage with their studies, providing greater flexibility and customisation to cater to individual aspirations and interests. The Maharaja Sayajirao University of Baroda is committed to continuing its legacy of excellence and leadership in the years to come (MSUB, 2026).

3. Review of Literature

Some of the prominent studies dealing with analysis of author productivity of institutions are discussed below. Mishra et al. (2022) assessed the research productivity of Jadavpur University during the time period from 2011 to 2020 as reflected in the Scopus database. Authors found that the article was the most preferred form of publication and most of them were published by multiple authors. The study identified Konar, A., as the most productive author. The study found that the largest number of papers were published in Advances in Intelligent Systems and Computers, and Engineering was identified as the most promising area for publication.

Dash & Chaudhary (2021) examined publications of the M.S. University of Baroda (MSU) indexed in the Scopus database from 2016 to 2020. Authors analysed the authorship pattern, subject-wise distribution, and collaboration. The study identified P.K. Jha as the most productive author and physics and Astronomy as the most productive subject. Chaudhary & Dash (2021) studied research output in Humanities and Social Sciences at The Maharaja Sayajirao University of Baroda (MSU) published during 2001 to 2020 in the Dimensions database. Authors identified that History and Archaeology have the highest publication rates, followed by historical studies and Sociology. Authors identified Kapadia, S and Biswas, U N as the top two authors as per the number of publications. Pandya et al. (2021) analysed

the 3927 articles published by 12 central universities retrieved from Scopus database during 2010-2019. Authors found that all the twelve universities had a significant increase in research productivity during the study period. Author identified that journal RSC Advances have the highest number of citations and Singh M affiliated with Central University of Gujarat has the highest citation. Sonkar et al. (2021) analysed the research contributions of nine central universities of India in science as reflected in web of science during the period of 2011 to 2020. Authors identified Banaras Hindu University, Varanasi, as the most productive and RSC was recognised as the most popular journal.

Singh et al. (2022) analysed the bibliometric patterns in research output of IIMs as available in Scopus during the time period of 2010-19. The authors observed that institutions such as IIM Ahmedabad and IIM Bangalore rank highest in terms of publication output and citation impact. Study identified that IIM Ahmedabad has the highest number of internationally collaborated papers and IIM Udaipur has highest citations per paper value amongst all the IIMs. Study identified 'supply-chain management', 'innovation', 'emerging markets', 'social media' and 'corporate governance' as the top five thematic areas of research in IIMs. Mahala & Singh (2021) examined the scientific research output of leading Indian universities based on data from the Web of Science database for the period 2015–2019. The authors identified the most productive authors, as well as key collaborating countries and institutions, and assessed research impact using indicators such as citations per paper (CPP) and relative citation impact (RCI). They also found that multi-authored papers tend to achieve greater citation impact. The authors identified the United States, South Korea, and Germany as the leading collaborating countries. Keshava et al. (2020) examined the research output of Tumkur University faculty from 2005 to 2019, using data from the Scopus database. The authors analysed year-wise distribution of papers, author productivity, authorship pattern, degree of collaboration, and institutional collaboration. The study identified Prof. S.C. Sharma as the most prolific author, and photoluminescence as the most frequently occurring keyword. Authors identified that multi-authored papers are more common than single-authored publications.

Vyas & Asnani (2018) analysed 2200 publications from the Maharaja Sayajirao University of Baroda available in Web of Science for the period 2009 to 2018. Author conducted a citation analysis to identify key journals, impact factor, and scientific productivity of authors in The MSU Baroda. Study identified chemistry and Chemistry & Pharmacology as the most prominent research area. Authors found that the Physical Review C Journal have the most citations and the USA was identified as having the most collaborations with the Maharaja Sayajirao University of Baroda. Kumar et al. (2015) analysed the research output of Gujarat University as recorded in the SCOPUS database during the period of 2004 to 2013.Authors identified the most prolific authors, collaborative authorship patterns and trends, and the most preferred publications. The study identified P.S. Srivastav as the most cited author, and V.K. Jain has the best average citations per paper.

4. Objectives of the Study:

Major objectives of the study are

i. To examine the year-wise contribution of publications in the Maharaja Sayajirao University of Baroda during the study period of 2015 to 2025.
ii. To analyse the distribution of publications by different types of documents.
iii. To identify the most productive authors in the publications of the Maharaja Sayajirao University of Baroda
iv. To assess author productivity patterns using Lotka's Law.
v. To study the year-wise distribution of publications based on the number of authors.
vi. To measure the degree of collaboration among authors.

5. Methodology

The data for the study were retrieved from the Web of Science database, a widely recognized and authoritative indexing platform originally developed by Thomson Reuters and currently maintained by Clarivate Analytics. Web of Science is the online counterpart of the Science Citation Index, initially produced by the Institute for Scientific Information, and is extensively used for bibliometric and Scientometric research. For data retrieval, a structured search strategy was employed using "The Maharaja Sayajirao University" and "India" as address-based keywords. The time span was restricted from 1 December 2015 to 1 December 2025, and the document type was refined to include only research articles to ensure consistency and relevance. The final dataset comprised 2,917

publications that were affiliated with The Maharaja Sayajirao University of Baroda. The retrieved data were systematically analysed using Microsoft Excel and Biblioshiny. These included document types, subject categories, source journals, contributing countries, departmental affiliations, author keywords, and citation-based metrics such as the h-index. This analytical approach enables a detailed understanding of the university's research productivity, collaboration patterns, and scholarly impact during the study period.

6. Data Analysis and Presentation

Data analysis and presentation constitute an essential component of research, enabling the systematic organisation, interpretation, and meaningful representation of collected data. In the present study, the data obtained from the ISI Web of Science were systematically analysed and presented using tables, percentages, and bibliometric indicators to understand the publication pattern and research performance of The Maharaja Sayajirao University of Baroda during 2015–2025. The analysed data is presented in the subsequent section in the form of tables, percentages, cumulative values, and citation-based indicators to examine the publication trends, authorship characteristics, document types, and research impact of The Maharaja Sayajirao University of Baroda during the period 2015–2025.

6.1 Citation Profile of the Maharaja Sayajirao University of Baroda

The citation profile of an institution reflects the scholarly community's recognition and influence of its research output. It is a significant bibliometric indicator used to evaluate the scholarly impact, visibility, and influence of research publications. Table 1 presents the citation profile of publications produced by The Maharaja Sayajirao University of Baroda and indexed in the ISI Web of Science during 2015–2025, highlighting total publications, citation counts, citing articles, average citations per item, and h-index. Table 1 provides the major citation indicators of The Maharaja Sayajirao University of Baroda's publications indexed in the ISI Web of Science during 2015–2025.

Table1: Citation Profile of the Maharaja Sayajirao University of Baroda

Bibliometric Indicators	**Number**
Total results	2917
Sum of times cited	45,808
Sum of times cited without self-citations	41,392
Citing articles	37,799
Citing articles without self-citations	36,287
Average citations per item	15.7
h-index	80

The citation indicators for The Maharaja Sayajirao University of Baroda's publications indexed in the ISI Web of Science from 2015 to 2025 indicate a high level of scholarly impact and research visibility. The university's 2,917 publications received 45,808 citations, which shows that the academic community has widely recognized and cited the research done at the university. The total number of citations remains very high at 41,392 when self-citations are excluded. This suggests that most of the citations came from researchers outside of the authors' own work. There were 37,799 citing articles citing the publications, but this dropped to 36,287 when self-citations were excluded. The average number of citations per item is 15.7, indicating that each publication receives many citations. The university had an h-index of 80, which means that 80 of its publications have been cited at least 80 times. This is a strong sign of both productivity and citation impact, indicating that there are many very important publications.

6.2 Year-Wise Contribution of Publications

Year wise analysis of publication output helps to assess the research progression and scholarly performance of an institution. It provides an important understanding of the growth and development of research output over a specific period. Table 2 presents the annual distribution, cumulative contributions, percentage shares, and growth rates of publications produced by The Maharaja Sayajirao University of Baroda and indexed in the ISI Web of Science during 2015–2025.

Table 2: Year-wise Contribution of Publications with ACGR

Publication Years	No. of Papers	Cumulative No. of Papers	Percentage of Papers (%)	Cumulative Percentage (%)	Annual Average Growth Rate Percentage (%)
2025	304	304	10.43	10.43	-12.14
2024	346	650	11.87	22.30	31.06
2023	264	914	9.06	31.36	-12.29
2022	301	1215	10.33	41.69	3.44
2021	291	1506	9.99	51.68	30.49
2020	223	1729	7.65	59.33	-9.72
2019	247	1976	8.48	67.81	-1.59
2018	251	2227	8.61	76.42	11.56
2017	225	2452	7.72	84.14	1.81
2016	221	2673	7.58	91.73	-8.30
2015	241	**2914**	8.27	**100.00**	Base Value
Total	**2914**		**100**		

Table 2 shows the year-wise distribution of publications of The Maharaja Sayajirao University of Baroda indexed in ISI Web of Science during 2015–2025. A total of 2,914 publications were produced during the study period. Among all years, 2024 recorded the highest number of publications (346; 11.87%), followed by 2025 (304; 10.43%) and 2022 (301; 10.33%), reflecting an increase in institutional research productivity in recent years. The total number of publications has steadily increased, reaching 1,506 (51.68%) by 2021. This means that more than half of all research output was produced in the last half of the study period. This could be seen as a recent surge in publications, suggesting that scholarly activity has increased in the last few years.

The annual average growth rate percentage further reveals the uneven nature of publication growth. The most significant positive growth was observed in 2024 (31.06%) and 2021 (30.49%), indicating sharp increases in research output compared to the preceding years. Moderate growth was also visible in 2018 (11.56%), 2022 (3.44%), and 2017 (1.81%). Several years, such as 2025 (-12.14%), 2023 (-12.29%), 2020 (-9.72%), 2016 (-8.30%), and 2019 (-1.59%), show negative growth, indicating a decline in publication output. Analysis indicates that although the university's publication performance did not adhere to a strictly linear upward course, it demonstrated significant growth in research productivity over time, especially in the post-2020 period. The sharp rise in publications in 2021 and 2024 may reflect increased research engagement, greater indexing visibility, collaborative output, or improved institutional emphasis on scholarly publishing.

6.3 Distribution of Publication by Type of Documents

Document type analysis provides insight into the preferred modes of scholarly dissemination adopted by researchers. The analysis of document types is an important bibliometric indicator that helps in understanding the nature and format of scholarly communication within an institution’s research output. Table 3 presents the distribution of publications of The Maharaja Sayajirao University of Baroda, indexed in the ISI Web of Science during 2015–2025, by document type, along with their cumulative frequency and percentage contribution.

Table 3: Distribution of Publications by Types of Documents

Document Types	No. of Papers	Cumulative No. of Papers	Percentage (%)	Cumulative No. of Percentage (%)
Article	2542	2542	87.14	87.14
Biographical Item	3	2545	0.10	87.24
Book Review	3	2548	0.10	87.35

Correction	18	2566	0.62	87.96
Editorial Material	34	2600	1.17	89.13
Letter	16	2616	0.55	89.68
Meeting Abstract	101	2717	3.46	93.14
News Item	1	2718	0.03	93.17
Proceedings Paper	22	2740	0.75	93.93
Retracted Publication	3	2743	0.10	94.03
Retraction	2	2745	0.07	94.10
Review	172	**2917**	5.90	**100**
Total	**2917**		**100**	

Table 3 identifies articles as the most prominent form of scholarly output. Out of the total 2,917 publications, 2,542 papers (87.14%) were published as articles. The second most significant document type is review papers, with 172 publications (5.90%). Meeting abstracts account for 101 publications (3.46%), indicating researchers' participation in academic conferences and scientific meetings. Other forms of publication contribute only a small proportion to the total output, such as editorial material (34; 1.17%), proceedings papers (22; 0.75%), corrections (18; 0.62%), and letters (16; 0.55%). A few document types such as biographical items (3; 0.10%), book reviews (3; 0.10%), retracted publications (3; 0.10%), retractions (2; 0.07%), and news items (1; 0.03%) represent only a small part of the total research output. The cumulative percentage shows that articles alone account for more than four-fifths of the total publications, and when combined with reviews and meeting abstracts, these three categories make up the overwhelming majority of the university's research contributions. The findings show that the university's publication profile is primarily focused on research articles, with other forms of academic communication playing only a minor role.

6.4 Most Productive Authors

Analysis of author productivity is an integral part of bibliometric analysis because it allows us to identify prolific authors and assess their productivity across various fields. Bibliometric indicators such as the h–index help assess research quality and the distribution of publications**.** Table 4 shows the top 20 most productive authors, their subject discipline, number of papers, H-index and Rank as per publication and H-Index.

Table 4: Most Productive Authors

Name of the Authors	Disciplines	No. of Papers (n=2917)	Percentage (%)	Rank as per publications	h-index	Rank as per h-index
Jha, Prafulla K	Physics	230	7.88	1	39	2
Jadeja, Rajendrasinh	Biochemistry &Mol.Biology	74	2.54	2	25	8
Yadav, Mange Ram	Pharmacy	60	2.06	3	29	5
Begum, Rasheedunnisa	Biochemistry &Mol.Biology	57	1.95	4	33	4
Devkar, Ranjitsinh	Pharmacy	56	1.92	5	25	8
Sawant, Krutika	Pharmacy	53	1.82	6	37	3
Rajput, Dr. Kishore S.	Botany	52	1.78	7	17	14
Bedekar, Ashutosh V.	Chemistry	51	1.75	8	27	7
Singh, Nand Lal	Physics	50	1.71	9	25	8
Patel, Anjali	Chemistry	50	1.71	10	14	16
Kanchan, Dinesh K	Physics	45	1.54	11	28	6
Makwana, Rajnikant	Physics	44	1.51	12	49	1
Singh, Rajesh	Biochemistry &Mol.Biology	41	1.41	13	25	8

Murumkar, Prashant	Pharmacy	40	1.37	14	22	10
Murthy, K. V. R.	Physics	40	1.37	15	21	12
Balakrishnan, Suresh	Zoology	39	1.34	16	12	
Thakore, Sonal	chemistry	37	1.27	17	24	9
Modi, Chetan K.	chemistry	37	1.27	18	19	13
Limbachiya, Chetan	Physics	36	0.012	19	22	11
Katariya, Kanu	Chemistry	36	1.23	20	16	15

Table 4 identifies Jha, Prafulla K (Physics), as the most prolific author with 230 publications, contributing 7.88% of the total output and securing the first rank in terms of publications. In terms of citation impact, Jha also performs strongly, ranking second with an h-index of 39. Makwana, Rajnikant (Physics), ranked twelfth in publication count with 44 papers, attains the highest h-index of 49. Sawant, Krutika (Pharmacy), ranked sixth in publications, secures the third position in h-index (37), while Begum, Rasheedunnisa (Biochemistry & Molecular Biology), ranked fourth in publications with fourth rank in h-index (33). However, several authors show a decline in ranking when evaluated through h-index. Jadeja, Rajendrasinh, ranked second in publications, falls to eighth position in h-index, while Patel, Anjali drops from tenth position in publication rank to sixteenth in h-index. Kanchan, Dinesh K advances from eleventh position in publications to sixth in h-index, and Bedekar, Ashutosh V improves from eighth to seventh, indicating relatively higher citation performance compared to their publication output. The disciplinary distribution further indicates that fields such as Physics, Chemistry, Pharmacy, and Biochemistry & Molecular Biology dominate the research output, with multiple authors appearing in top ranks. The clear differences between publication rank and h-index rank highlight the need for bibliometric evaluation to include both qualitative (citation impact) and quantitative (publication count) indicators to provide a more thorough assessment of research performance.

6.5 Author Productivity through Lotka's Law

In 1926, Alfred J. Lotka introduced an inverse-square law describing the distribution of scientific productivity among authors. Lotka's Law describes the frequency distribution of publications by authors within a given field and remains one of the fundamental laws of bibliometrics. According to this law, "the number of authors producing *n* contributions is inversely proportional to the square of *n*. In other words, the number of authors making *n* contributions is approximately $1/n^2$ of those making a single contribution" (Sahu &Jena, 2022). Mathematically, Lotka's Law can be expressed as $x^n y = C$, where *y* represents the frequency of authors making *n* contributions, *x* denotes the number of publications, *n* is typically close to 2, and *C* is a constant. In Lotka's original study, the value of the constant (*C*) was estimated to be approximately 0.6079. This shows that a large proportion of authors contribute minimally, while a small number of highly productive authors account for a significant share of the total scholarly output. Table 5 shows the Author Productivity.

Table 5: Author Productivity through Lotka's Law through Lotka's Law

Documents written	N. of Authors	Proportion of Authors	Theoretical
1	5407	0.72	0.615
2	850	0.113	0.154
3	373	0.05	0.068
4	217	0.029	0.038
5	144	0.019	0.025
6	93	0.012	0.017
7	72	0.01	0.013
8	56	0.007	0.01
9	38	0.005	0.008
10	30	0.004	0.006

The distribution of authorship productivity presented in Table 5 shows that a majority of authors (5,407, accounting for 72%) have contributed only a single publication, which is slightly higher than the theoretical proportion of 0.615. This indicates a strong concentration of occasional contributors within the research output. As the number of documents increases, the proportion of authors decreases sharply. Authors with two publications constitute 11.3% of the total, which is lower than the theoretical expectation of 15.4%, while those with three publications account for only 5%, which closely aligns with the theoretical value of 6.8%. Authors contributing four, five, and six papers represent 2.9%, 1.9%, and 1.2% respectively; showing a gradual decrease that broadly follows the inverse square distribution pattern. The percentage drops to just

0.4% of authors publishing 10 publications, compared with the predicted value of 0.6%. With the exception of single-contribution writers, the observed values in the majority of categories are marginally lower than the predicted proportions. Findings of the study demonstrate a close conformity to Lotka's Law, confirming that a large proportion of authors contribute minimally, while only a small fraction of highly productive authors account for multiple publications. Minor deviations between observed and theoretical values may be attributed to disciplinary variations, database coverage, and institutional research characteristics.

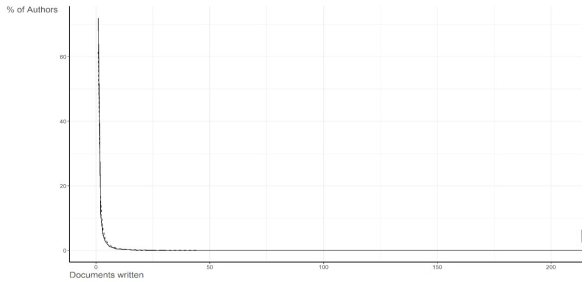


Fig. 1- Author Productivity through Lotka's Law

Figure 1 shows that the highest proportion of authors is concentrated at the lowest level of productivity (i.e., authors contributing only one document. This pattern closely matches the inverse-square distribution described by Lotka's Law. The long tail of the curve represents a small group of highly prolific authors, while the steep initial slope highlights the dominance of occasional contributors. The close alignment of the observed curve with the expected theoretical trend suggests conformity with Lotka's Law, although slight deviations may exist due to institutional or disciplinary characteristics.

6.6 Year-wise Distribution of Publications by Number of Authors

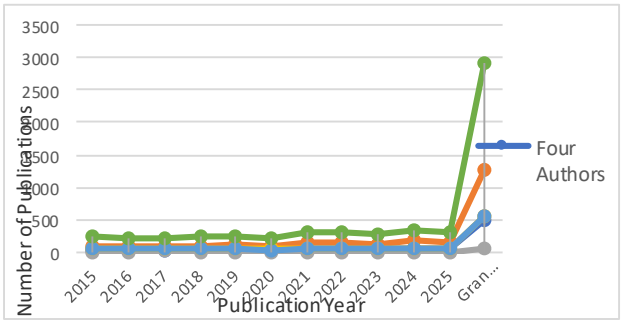
Authorship pattern analysis provides insights into the nature and extent of research collaboration within a scholarly community. The distribution of publications by number of authors helps us understand whether research is predominantly individual or collaborative. Table 6 shows the year-wise distribution of publications according to authorship patterns, categorized into single-author, two-author, three-author, four-author, and more than four-author contributions over the study period.

Table 6: Year-wise Distribution of Publications by Number of Authors

Publication Year	Four Authors	More than Four Authors	Single Author	Three Authors	Two Authors	Total
2015	35	84	8	52	62	241
2016	47	79	4	43	48	221
2017	35	78	11	46	55	225
2018	42	102	6	50	51	251
2019	37	104	5	47	54	247
2020	47	94	2	44	35	222
2021	43	145	3	53	47	291
2022	51	144	9	50	47	301
2023	44	110	4	59	47	264
2024	51	185	1	55	54	346
2025	54	158	7	46	43	308
Grand Total	**486**	**1283**	**60**	**545**	**543**	**2917**

Table 6 shows that, out of the total 2,917 publications, the highest contribution comes from papers with more than four authors (1,283; 43.97%), followed by three-author (545; 18.68%) and two-author papers (543; 18.61%). Single-author publications are minimal, accounting for only 60 papers (2.06%), indicating a strong preference for collaboration. Analysis shows that multi-authored publications, particularly those with more than four authors, have increased significantly over time. For instance, such papers rose from 84 in 2015 to a peak of 185 in 2024, before slightly declining to 158 in 2025. Similarly, four-author publications also show a gradual increase, from 35 in 2015 to 54 in 2025. Table 6 shows that single-author publications remain

consistently low throughout the study period, with the highest count being only 11 in 2017 and dropping to as low as 1 in 2024. Papers with two or three authors exhibit stable trends with small variations, signifying their ongoing significance in collaborative frameworks, although they are overshadowed by larger author groups. The overall pattern shows a strong preference for collaborative authorship placing



an increasing emphasis on multidisciplinary approaches and teamwork. Figure 2 shows year-wise distribution of publications by number of authors.

Fig. 2 - Year-wise Distribution of Publications by Number of Authors

6.7 Degree of Collaboration

Table 7 shows the year-wise distribution of single- and multiple-authored publications and calculates the degree of collaboration to identify the prevailing trend in collaborative research. Subramanyam's formula was used to calculate the degree of collaboration, C=Nm/ (Ns+Nm), where Nm is the number of multi-authored papers, and Ns is the number of single-authored papers (Samanta et al., 2023).

Table 7: Year-wise Degree of Collaboration

Year	Single Author (Ns)	Multiple Author (Nm)	Degree of Collaboration C=(Nm/(Ns+Nm))
2015	8	233	0.97
2016	4	217	0.98
2017	11	214	0.95
2018	6	245	0.98
2019	5	242	0.98
2020	2	220	0.99
2021	3	288	0.99
2022	9	292	0.97
2023	4	260	0.98
2024	1	345	1.00
2025	7	301	0.98
Total	60	2857	0.98

The analysis of the degree of collaboration presented in table 7 clearly indicates a strong dominance of multi-authored research. The collaboration index ranges from 0.95 to 1.00, with an overall average of 0.98, reflecting a high level of collaboration. Year-wise analysis reveals that the degree of collaboration was already high at 0.97 in 2015 and further increased to 0.98 in 2016, slightly dipping to 0.95 in 2017 due to a relatively higher number of single-authored papers. However, from 2018 onwards, the values consistently remain at 0.97 or above, reaching a peak of 1.00 in 2024, where almost all publications were multi-authored. The number of single-authored papers remains extremely low across all years, totalling only 60 out of 2,917 publications (approximately 2.06%), whereas multi-authored papers dominate with 2,857 publications (97.94%). Findings demonstrate that research output is highly collaborative, aligning with global trends in scientific communication. The constantly high level of collaboration highlights the increasing interdependence among academics and reflects the multifaceted nature of contemporary research.

7. Findings of the Study

Findings of the study show that publications of The Maharaja Sayajirao University of Baroda, as reflected in Web of Science from 2015 to 2025, received a total of 45, 808 citations. The average citation per publication is 15.7, indicating extensive academic recognition and the university's h-index is 80. The highest number of publications was recorded in 2024 (346; 11.87%), followed by 2025 (304; 10.43%) and 2022 (301; 10.33%), reflecting an increase in institutional research productivity in recent years. Analysis shows significant increases in research productivity over time, particularly after 2020. Among 2,917 total publications, 2,542 (87.14%) are scholarly articles, making them the most significant form of output. Analysis shows that articles, reviews, and meeting abstracts dominate the university's research contributions, indicating a strong focus on research articles. Jha, Prafulla K (Physics) emerges as the most prolific author with 230 publications, contributing 7.88% of the total output and securing the first rank in terms of publications. Makwana, Rajnikant (Physics), ranked twelfth in publication count with 44 papers, attains the highest h-index of 49. Study conducted by Dash & Chaudhary (2021) & Vyas& Asnani (2018) supports these findings. Analysis of authorship productivity reveals that 72%

of authors contributed only one publication, exceeding the theoretical expectation of 61.5%. The proportion of authors declines with increasing publication counts: 11.3% for two publications (below the expected 15.4%) and 5% for three (close to the 6.8% prediction), demonstrating close conformity to Lotka's Law. Analysis shows that the highest contribution of papers comes from 'more than four authors' (43.97%), followed by 'three-author papers' (18.68%) and 'two-author papers' (18.61%). Single-author publications account for 2.06% of papers, indicating a strong preference for collaboration. Analysis reveals a significant prevalence of multi-authored research, with a collaboration index averaging at 0.98. The degree of collaboration started high at 0.97 in 2015, increased to 0.98 in 2016, dropped slightly to 0.95 in 2017, and remained at 0.97 or higher, peaking at 1.00 in 2024, emphasizing the dominance of multi-authored works. These findings align with global trends, reflecting the increasing interdependence and collaborative nature of contemporary research. Analysis shows that the most-cited paper addressed antimicrobial resistance, with 382 citations and an average of 76.4 per year.

8. Conclusion

Bibliometrics has contributed greatly to the development of Library and Information Science, particularly on the theoretical side. The subject is still at a developmental stage. Except for citation analysis, the practical utilisation of bibliometrics is presently very limited. The crux of bibliometrics is that it is "largely used only to describe bibliometric phenomena, and is not yet able to explain or predict these phenomena; it is merely a method, not a theory. To make it a theory and more useful, researchers must concentrate on the causal factors underlying bibliometric phenomena" (Hubert,1981). Today, it has become a significant area of study for tracking the advancement of a research group's, an organisation's, a university's, etc., scientific performance. Bibliometrics is the study of assessing the performance of researchers and their publications. To assess the calibre of the research endeavours and information output of The M S University of Baroda, the study examines performance-based research output and establishes benchmarks.

References

1) Broadus, R. N. (1987). Toward a definition of bibliometrics. *Scientometrics, 12*(5–6), 373–379. https://doi.org/10.1007/BF02016680
2) Chaudhary, A. S., & Dash, R. N. (2021).A Systematic Study of Research Productivity of the Disciplines in Social Sciences and Humanities: The Maharaja Sayajirao University of Baroda. *Library Philosophy and Practice (e-journal)*, 5950, 1-20. https://digitalcommons.unl.edu/libphilprac/5950
3) Dash, R. N., & Chaudhary, A. S. (2021). Authorship Pattern and Growth of Scholar Contributions of the M S University of Baroda: Using Scopus Database. *Library Philosophy and Practice (ejournal)*, 5728, 1-20. https://digitalcommons.unl.edu/libphilprac/5728
4) Egghe, L., & Rousseau, R. (1990). *Introduction to informetrics: Quantitative methods in library, documentation and information science,* Elsevier.
5) Hood, W. W., & Wilson, C. S. (2001). The literature of bibliometrics, scientometrics, and informetrics. *Scientometrics, 52*(2), 291–314. https://doi.org/10.1023/A:1017919924342
6) Hubert, J. J. (1981). General bibliometric models. *Library Trends* 30 (1), 65-81
7) Keshava, Kanth, S. P. L., Mamatha. V., & Shanthakumari, K. (2020). Scientometric Analysis of Publication Output of Tumkur University Faculty: A Study Based on Scopus Database. *Journal of Indian Library Association,* 56 (4), 16-28. https://www.ilaindia.net/journal/index.php/lib/article /view/682
8) Kumar, H. A., Dora, M., & Desai, A.(2015). A Bibliometrics Profile of Gujarat University, Ahmedabad during 2004-2013. *DESIDOC Journal of Library & Information Technology*, 35 (1), 9-16. https://doi.org/10.14429/djlit.35.1.7699
9) Mahala, A., & Singh, R. (2021). Research output of Indian universities in sciences (2015–2019): A scientometric analysis. *Library Hi Tech*, 39 (4), 984–1000. https://doi.org/10.1108/LHT-09-2020-0224
10) Mishra, P., Rout, S. K., & Sahu, R. R. (2022). Mapping the Research Productivity of Jadavpur University, a Period from 2011-2020: A Bibliometric Analysis. *KIIT - Journal of Library and Information Management*, 9(1), 1-12. https://doi.org/10.5958/2455-8060.2022.00001.5
11) MSUB (2026). About MSUB. https://msubaroda.ac.in/Brief_Profile_of_MSUB
12) Nicholas, D., & Ritchie, M. (1978). *Literature and bibliometrics*, Clive Bingley.
13) Ningayya & Kumar H. (2025). About Scientometrics: An Overview. *Journal of Library*

and Information Science Technology, 7(1), 13-24. https://doi.org/10.34218/ JLIST_ 07_01_002

14) Pandya, M. Y., Joorel, J. P. S., & Solanki, H. (2021). Research productivity of newly established central universities in India. *Annals of Library and Information Studies*, 68 (1), 67-74 https://nopr.niscpr.res.in/handle/123456789/57110
15) Pritchard, A. (1969). Statistical bibliography or bibliometrics? *Journal of Documentation, 25*(4), 348–349.
16) Sahu, A., & Jena, P. (2022). Lotka's law and author productivity pattern of research in law discipline. *Collection and Curation*, 41 (2), 62–73, https://doi.org/10.1108/CC-04-2021-0012
17) Samanta, S.,, Rautaray, B.,& Swain, D. K. (2023) Intellectual structure and pattern of publication in the International Journal of Innovation Science: a bibliometric study. *International Journal of Innovation Science*, 15(2) (2023) 279–301. https://doi.org/10.1108/IJIS-06-2021-0103
18) Sengupta, I. N. (2009). Bibliometrics, informetrics, scientometrics and librametrics: An overview. *Libri, 42*(2), 75–98. https://doi.org/10.1515/libr.1992.42.2.75
19) Singh, P., Nandy, A., & Singh, V. K. (2022). A Bibliometric Analysis of Research Output from Indian Institutes of Management. *DESIDOC Journal of Library & Information Technology*, 42 (6), 364-376. https://doi.org/10.14429/djlit.42.6.18316
20) Sonkar, S. K., Kumar, S., Mahala, A., & Tripathi, M. (2021). Science Research in Indian Universities: A Bibliometric Analysis. *Journal of Scientometric Research*, 10(2), 184-194. https://doi.org/10.5530/jscires.10.2.33
21) Thanuskodi, S. (2010). Journal of social sciences: A bibliometric study. *Journal of Social Sciences, 24*(2), 77–80. https://doi.org/10.1080/09718923.2010.11892847
22) Vyas, P., & Asnani, R. (2018). Scholarly Publications of The Maharaja Sayajirao University Of Baroda, Vadodara: A Bibliometrics Study. *Towards Excellence*, 10(2), 202-208. https://doi.org/10.37867/100225